



SOIL INVESTIGATION

REPORT

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ACKNOWLEDGEMENTS

We feel pleasure to submit the report of Sub soil investigation conducted at site for High Ash Coal to Ammonium Nitrate Plant. We convey hereby our sincere thanks to PDIL, BCGCL for his trust shown to us by awarding the work of soil investigation. We also grateful to site staff, for their co-operation and help rendered during and prior to the investigation work.

We are also thankful to our staff members for conducting field and laboratory test, preparing the sketches and typing the report.

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1. INTRODUCTION:

This report deals with Geo-technical investigation at the site for High Ash Coal to Ammonium Nitrate Plant. The work of conducting the detailed Geotechnical Investigation has been awarded to us via contract No. No: GEMC-511687728870200 dated 08th August 2024, which scope of includes investigation in field, laboratory testing of bulk samples collected from the site and submission of the test report.

Geotechnical investigation carried out, with the locations which were planned by the client. Purpose of the investigation is to determine the nature and properties of soil strata in the bore holes and representing them through log sections showing the levels, nature and properties of various strata up to a sufficient depth below the level suitable for foundation, proneness of site to artesian conditions, seismic disturbance and other engineering properties of soil.

This part of report includes the detailed methodology of investigation, collection of samples, field and laboratory test result including their interpretation/ analysis, recommendations on the properties of soils required for design of foundation and suggesting suitable type of foundation with safe allowable bearing capacity for safe and strong foundation.

A summarized table with reference of boreholes notation is given below

Part No.	Reference of bore holes
1	BH-1 to BH-20

2. SCOPE OF WORK:

For the Construction High Ash Coal to Ammonium Nitrate Plant, it is required to determine the safe allowable bearing capacity together with necessary engineering characteristics of underlying soil strata. Since the safe bearing capacity of soils must be evaluated on the considerations covering shear failure and permissible settlement of sub-soil strata as per IS: 6403, IS: 1904 and IS: 8009 (part-I) hence the scope of work is as follows:

- 2.1.** Mobilization of all tools & plants along with accessories, materials, labours etc. at site of work for drilling and testing work, including setting up boring and shifting to different bore holes point etc.
- 2.2.** Exploratory drilling of 150mm diameter bore holes through soil deposits and 76mm (NX) diameter boreholes through rock deposits within the proposed area of construction up to required depth.
- 2.3.** Collection of disturbed soil samples at an interval of 0.50, 1.50 & 3.0 meter in all the bore holes.
- 2.4.** Collection of undisturbed soil samples at every 2.0 m interval or at change of stratum from all the boreholes.
- 2.5.** Conducting the Standard Penetration Test (SPT) at an interval of 1.50 m or noticeable change of stratum in soil deposits in all bore holes.
- 2.6.** Transporting all the disturbed and undisturbed soils and rock core samples collected during the field investigation to our Geo-tech Engineering laboratory in Delhi.
- 2.7.** Conducting the laboratory tests on all the soil samples, collected during field investigation for determination of their engineering characteristics.
- 2.8.** Compilation of field and laboratory test results, working out the safe allowable bearing capacity and preparing the report including detailed recommendations and necessary precautions.

3. GEOLOGICAL INFORMATION OF THE REGION:

3.1. Geology:

The geology of Jharsuguda district in Odisha, India is diverse and includes a variety of rock types, formations, and minerals:

- **Rock types**

The district has many types of rock, including phyllite, mica schist, shale, calcareous shale, quartzite, coarse sandstone, conglomerate, and red clay, granite, and granite gneiss

- **Formations**

The district has several rock formations, including the Gangpur Group, the Raipur Group, the Chandarpur Group, the Gondwana Super Group, and the Kamthi Formation

- **Minerals**

The district has many minerals, including coal, fire clay, quartz, quartzite, sand, gravel, kyanite, sillimanite, opaque beryl, tourmaline, columbite-tantalite, feldspar, and pyroxene granulites

- **Pegmatites**

The district has pegmatites, including the Dhubenbud pegmatite and the Gantamal pegmatite, which contain rare metal mineralization and beryl crystals

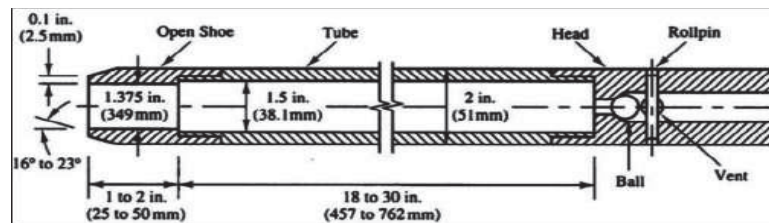
3.2. Geography:

Jharsuguda district is bounded between the latitudes 21° 34' North and 22°02' North and longitudes 83°25' East and 84°23' East. Prior to 1993, Jharsuguda was a subdivision of Sambalpur District and was subsequently awarded the status of a new district. It is bounded in the north by Sundergarh district, east by Sambalpur district, south by Sambalpur and Baragarh district and west by Raigarh district of Chattisgarh State. The total geographical area is 1874.98 sq. km. It is divided into five administrative blocks namely Lakhanpur, Jharsuguda, Kirimira, Laikera, Kolabira.

4. FIELD INVESTIGATION:

The field investigation work at this site was carried out on August 24th to 06th, September 2023. The following investigation work was carried out:

- 4.1.** Total Twenty number of **boreholes** of diameter 150 mm through soil deposits and 76mm (NX) diameter through rock deposits were made within the proposed layout of the site. The boreholes were progressed using wash boring under percussion method of drilling. Casing was used to keep the borehole stable. The records of achieved depth of bore holes have been given in Para No. 6.
- 4.2. Standard Penetration Tests** were conducted at 1.50 metre as per the procedure in IS 2131-1981 in all the bore holes. For conducting the test, the bottom of the borehole was properly cleaned and split spoon sampler was properly seated in position in the borehole. The split spoon sampler resting on the bottom of borehole was allowed to sink under its own weight; then the sampler was allowed to penetrate 15 cm with the blows of the hammer 63.50 kg weight falling free through 75cm, thereafter the split spoon sampler was further driven by another 15 cm. For the 3rd and final drive, the sampler was further allowed to penetrate 15 cm. The number of blows required to affect each 15 cm of penetration was recorded. The first 15 cm of drive is considered to be seating drive.



Structure of SPT Sampler

The SPT Samplers used were without liner type and with no space for liner.

The total blows of penetration for the second and third 15 cm of penetration is termed the penetration resistance N. The N' values are indicative of the compactness/ relative density of cohesion less soils and consistency of cohesive soils.

In case the blows count of SPT in soil (including the number of blows of seating) exceeds 100, the corresponding penetration was recorded and this particular test at that depth stopped. If the total penetration is more than the seating penetration of 15 cm, then breakup of blows count for 15 cm seating penetration and for remaining portion of penetration is also given.

SPT 'N' values are correlated with relative of non-cohesive stratum as per BS: 5930 (1999) - for sandy strata and with consistency of cohesive stratum.

CORRELATION FOR CLAY/PLASTIC SILT		CORRELATION FOR SAND/NON-PLASTIC SILT	
Consistency of clays	Penetration Value	Relative Density of sand	Penetration Value
Very Soft	0 to 2 Blows	Very loose	0 to 4 Blows
Soft	3 to 4 Blows	Loose	5 to 10 Blows
Medium Stiff	5 to 8 Blows	Medium	11 to 30 Blows
Stiff	9 to 16 Blows	Dense	31 to 50 Blows
Very Stiff	17 to 32 Blows	Very Dense	Above 50
Hard	Above 32		

In this method, the sampler acts as a probe and the driving energy is supplied by the fall of the drop weight. The values of 'N' depend on the compactness or relative density of the materiel. In hard formations, the testing is discontinued if 'N' value is found to be more than 100. It is termed as refusal.

'N' value depends upon degree of saturation and over burden pressure of the formation. Silty fine sand and fine sand below the water table develop pore water pressure depending on the in-situ void ratio which in turn affects the effective stress. This change in effective stress influences the 'N' value considerably.

Terzaghi and peck have recommended a correction for 'N' values in case of saturated silty and fine sand when the 'N' observed in the field is higher than

$$\text{Modified value 'N'} = 15 + (N-15)/2.$$

Soil sample obtained from standard spoon sampler for all above standard penetration tests were collected in the polythene bags of suitable size. These samples were property seal, labelled, record and carefully transported to the laboratory for testing. The results have been reported in Appendix C under the title “RESULTS OF LAB TESTS”

4.3. Disturbed soil samples were collected at 0.50, 1.25 & 3.0m interval and at significant change of stratum. Soil from cutting edge of SPT samplers and retained in split spoon sampler, used for Standard Penetration Tests was taken as disturbed samples. These samples were placed without delay in adequately sealed polythene bags. Where the collection of disturbed soil samples could not be collected from SPT samples, Shelby tubes were driven and retained soil samples were obtained. The laboratory tests were conducted on the collected soil samples and reported in Appendix C under the title “RESULTS OF LAB TESTS”.

4.4. Undisturbed soil samples were collected in accordance with IS: 2132-1986. Undisturbed soil samples (UDS) was obtained at every 2.0 metre interval. Undisturbed samples were collected using 100 mm dia and 450 mm long MS tubes provided with sampler head with ball check arrangement. Collection of Undisturbed samples in very hard cohesive soils/ dense granular soils/gravels/ cobbles/ pebbles/ boulders, refusal strata is practically not possible and such collected samples will not truly represent the undisturbed conditions. Immediately after taking undisturbed sample in a tube, the adopter head was removed along with the disturbed material. The visible ends of the samples shall each be trimmed off any wet disturbed soil. The ends will then be coated alternately with four layers of just molten wax. More molten wax will then be added to give a total thickness of not less than 25mm. The laboratory test results have been reported in Appendix C.

5. LABORATORY TESTS:

The following laboratory tests were conducted in our in-house NABL Accredited Laboratory under the supervision of trained personnel so as to determine the engineering characteristics of sub-soils:

- 5.1. **Moisture contents** were determined by oven drying method as per IS 2720 (part II)-2010. The results have been reported in “RESULTS OF LAB TESTS” of Appendix C.
- 5.2. **Bulk density** of soil strata were obtained using Shelby tubes in accordance with IS 2720 (part XXIX)-1975. The results have been reported in “RESULTS OF LAB TESTS” of Appendix C.
- 5.3. **Mechanical sieve analysis** test were performed in accordance with IS 2720 (Part IV) - 2010, for the purpose of identification by grain size analysis, on coarse part of the soil samples and the results have been reported in “RESULTS OF LAB TESTS” of Appendix C.
- 5.4. **Particle size analysis** test by **hydrometer method** were performed in accordance with IS 2720 (Part IV) - 1965 on the part of soil samples obtained after the sieve analysis. The results have been reported in “RESULTS OF LAB TESTS” of Appendix C.
- 5.5. **Atterbergs’ limits tests** were performed in accordance with IS 2720 (part V)-2010 and results have been reported in “RESULTS OF LAB TESTS” of Appendix C.
- 5.6. **Specific gravity tests** were performed in accordance with IS 2720 (part III-sec. 1) - 2011 and the results have been reported in “RESULTS OF LAB TESTS” of Appendix C.
- 5.7. **Consolidation tests** were performed on cohesive soil samples in accordance with IS: 2720 (part XV)-2011. The results have been reported in “RESULTS OF LAB TESTS” of Appendix C.
- 5.8. **Direct shear tests** were performed as per IS 2720 (part XIII)-2016, on the undisturbed soil samples obtained during the field investigation. The results and the density of samples have been reported in “RESULTS OF LAB TESTS” of Appendix C.

5.9. Tri-axial Compression Test under Unconsolidated Un-drained (UU) conditions as per IS: 2720 (Part-XI)-2011 were performed on the undisturbed soil samples obtained during the field investigation. The results have been reported in “RESULTS OF LAB TESTS” of Appendix C.

6. GROUND WATER TABLE:

The water table at this site was encountered during the boring operation up to the depth of exploration.

Borehole No.	Depth of Borehole (m)	Water Table (m)	Borehole No.	Depth of Borehole (m)	Water Table (m)
BH-1	30.00	2.10	BH-11	30.00	2.50
BH-2	20.00	2.40	BH-12	20.00	1.70
BH-3	30.00	1.90	BH-13	30.00	2.50
BH-4	20.00	2.30	BH-14	20.00	2.60
BH-5	30.00	1.80	BH-15	30.00	2.80
BH-6	20.00	2.10	BH-16	20.00	2.20
BH-7	30.00	1.90	BH-17	30.00	2.25
BH-8	20.00	2.25	BH-18	20.00	2.00
BH-9	30.00	2.30	BH-19	30.00	2.45
BH-10	20.00	2.10	BH-20	20.00	2.10

7. DETAILS OF SOIL STRATA:

The classification of soil stratum has been done with the help of soil characteristics obtained in laboratory tests as per IS 1498-1978. The detailed nature of the soil strata has been reported in: “RESULTS OF LAB TESTS” of Appendix C.

Borehole wise description of the formations has been given in the individual borelogs in Appendix B.

8. CALCULATIONS AND RESULTS:

For the High Ash Coal to Ammonium Nitrate Plant Isolated, Raft, Strip, Combined footing has been considered for computation of load bearing capacity of the underlying soil strata. The safe allowable bearing capacity for the open foundations have been calculated on the shear failure criteria suggested as per IS 6403, IS: 1904 and settlement criteria as per IS: 8009 (part-I).

8.1 RAFTS/STRIP/ISOLATED/COMBINED FOOTINGS:

8.1.1. Shear Failure Criteria:

Type of shear failure	Mixed (Interpolation in between = General and Local shear failure)
Factor of safety (F.S.)	= 2.50
Depth of critical water table	= 0.00 metre (at Natural Ground Level)
Net allowable bearing capacity:	= $q_{na}(\text{kN/m}^2)$

$$q_{na} = (1 / \text{F.S.}) [0.667c N_c S_c d_c + q (N_q - 1) S_q d_q + 0.5 B \gamma N_\gamma S_\gamma d_\gamma W']$$

Where,

- B = Width of footing (metre)
- D = Depth of footing (metre)
- Φ = Angle of shearing resistance (degree)
- c = Cohesion intercept (kN/m^2)
- γ = Bulk density of soil above the base of footing (kN/m^3)

$q = \gamma =$ Effective overburden (kN/m^2)

$N_c, N_q, N_\gamma =$ Bearing capacity coefficient based on initial void ratio e_0

$d_c, d_q, d_\gamma =$ depth factors

$W' =$ Water table correction factor

Shape Factors:

$S_c = 1.30$

$S_q = 1.20$

$S_\gamma = 0.80$

Calculations based on Shear failure criteria have been provided in **Appendix-D**

8.2 SETTLEMENT CRITERIA:

Soil strata at this site mainly consists of silty sands with gravels and rock, hence the settlement of the soil layers below the base of footing has been calculated on the basis of SPT values obtained during the field Investigation

Settlement for applied pressure (S_f) = $(q_s \times S_u \times d_f) / (W' \times 100)$

Where:

$q_s =$ Permissible pressure (kN/m^2)

$S_u =$ Settlement for unit pressure of 1.00 kg/cm^2

$W' =$ Water table correction factor

$N =$ Corrected average SPT value

$B =$ Base width

$D =$ Depth of footing

$d_f =$ depth factor

The calculated values of settlements have been kept within the permissible limits of 50 mm for isolated footings and 75mm for raft footings.

Calculations based on Settlement criteria have been provided in Appendix -D

9 RECOMMENDATIONS:

Keeping in mind, the field test results, laboratory test results and IS codes of practice the following recommendations are hereby made.

9.1 Isolated/Strip/Raft/Combined footing the suitable depth and corresponding recommended bearing capacity shall be read from the table below:

For all building structures we recommended the following bearing capacities mentioned below in tables: -

Average Soil Profile Adopted for SBC Calculations													
Borehole (BH-1 -20)								Water correction factor = 0.5					
Depth of Foundation, m	Average N Value Adopted	Bulk Density of Soil, gm/cc	Cohesion 'c' t/m ²	Angle of Shearing Resistance 'φ' degree	Bearing Capacity Factors			Depth Factors			Shape Factors		
D	N	g	c	φ	Nc	Nq	Ng	dc	dq	dg	sc	sq	sg
1.0	21	1.735	0.0	33.00	38.63	26.09	35.18	1.1	1.1	1.1	1.3	1.2	0.8
2.0	21	1.735	0.0	33.00	38.63	26.09	35.18	1.2	1.1	1.1	1.3	1.2	0.8
3.0	21	1.735	0.0	33.00	38.63	26.09	35.18	1.3	1.1	1.1	1.3	1.2	0.8

Notes: -

1. The shear parameters for calculating bearing capacities of soil have been taken as per IS 6403:1981 (Fig. 1).
2. Rigidity factor is taken as 1 for 25mm & 40mm settlement and 0.80 for 75mm settlement.
3. SBC of rock has been calculated by RMR system as Per IS 12070-1987.

Depth of Foundation below EGL	Width of Foundation	Recommended Allowable bearing pressure (t/sqm)	
		Borehole Group (BH-1 - 20)	
(m)	(m)	Founding layer	NABC (t/sqm)
1.0	1.0 to 6.0m	Soil	10.0
2.0		Soil	15.0
3.0		Soil	20.0

For foundations which are to be placed on rocky strata, allowable bearing pressure is worked out based on RMR as per IS 12070: 1987 and other field/lab test results. and the same is recommended as 50 t/sqm considering 0.5m embedment inside the rock.

- 9.2** All depth referred in recommendation of SBC, have been measured from below ground level.
- 9.3** Since all the locations incorporated in this report do not consist of harmful chemicals, OPC/Flyash based cement may be used for all civil constructions in accordance with IS 456: 2000 (RA 2021).
- 9.4** The soil available at site is suitable for filling/backfilling purposes.

10 References:

Latest Indian/International published standards have been used for testing and analysis purposes as listed below:

1. IS 6403 – 1981 (RA 2021): Code of Practice for Determination of Bearing Capacity of shallow Foundations.
2. IS 8009 (Part I) – 1978 (RA 2023): Code of Practice for Calculation of Settlements of Foundations.
3. IS: 1904-2021 “General requirements for design and construction of foundations in soils”.
4. Foundation Design Manual, N. V. Nayak, 4th Edition, 1996.
5. Foundation Analysis and Design, Joseph E. Bowels.
6. IS-1498, IS-2131, IS-2132, IS-1892 and Various Parts of IS-2720
7. IS 12070: 1987 (RA 2020): Code of Practice for Design and Construction of Shallow Foundations on Rocks.

APPENDIX – A **SITE PHOTOGRAPHS**





APPENDIX – B LOG of BORE HOLES

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).												
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE				
	24/08/2024 - 26/08/2024		B-1	30.00		2.10		ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values					
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD	
225.7	0.00											
225.2		0.50	DS-1	0.50	Gravelly sand	SM	0.50					
224.2	0.50	1.50	DS-2	1.50			1.50	SPT-1	16	23	-	-
222.7	1.50	3.00	DS-3	3.00			3.00	SPT-2	22	20	-	-
221.2	3.00	4.50	DS-4	4.50			4.50	SPT-3	25	20	-	-
219.7	4.50	6.00	DS-5	6.00			6.00	SPT-4	>75		8.8%	
218.2	6.00	7.50	DS-6	7.50	Highly weathered rock	MR	7.50	SPT-5	>75		9.6%	-
216.7	7.50	9.00	DS-7	9.00			9.00	SPT-6	>75		9.4%	-
215.2	9.00	10.50	DS-8	10.50			10.50	SPT-7	>75		11.3%	-
213.7	10.50	12.00										
212.2	12.00	13.50	DS-9	12.50			12.50	SPT-8	>75		10.4%	-
210.7	13.50	15.00	DS-10	14.50			14.50	SPT-9	>75		10.2%	-
209.2	15.00	16.50	DS-11	16.50			16.50	SPT-10	>75		11.5%	-
207.7	16.50	18.00										
206.2	18.00	19.50	DS-12	18.50			18.50	SPT-11	>75		12.4%	-
204.7	19.50	21.00	DS-13	20.50			20.50	SPT-12	>75		15.7%	-
203.2	21.00	22.50										
201.7	22.50	24.00	DS-14	23.50			23.50	SPT-13	>75		13.4%	-
200.2	24.00	25.50										
198.7	25.50	27.00	DS-15	26.50			26.50	SPT-14	>75		13.0%	-
197.2	27.00	28.50										
195.7	28.50	30.00	DS-16	29.50			29.50	SPT-15	>75		14.2%	-

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).												
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE				
	24/08/2024-25/08/2024		B-2	20.00		2.40		ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values					
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD	
220.1												
219.6	0.00		DS-1	0.50	Gravely sand	SM	0.50					
		0.50					SPT-1	14	20	-	-	
218.6	0.50		DS-2	1.50			1.50					
		1.50										
217.1	1.50		DS-3	3.00			3.00	SPT-2	20	19	-	-
		3.00										
215.6	3.00		DS-4	4.50			4.50	SPT-3	27	21	-	-
		4.50										
214.1	4.50		DS-5	6.00	Highly weathered rock		6.00	SPT-4	>75	7.4%	-	
		6.00										
212.6	6.00		DS-6	7.50			7.50	SPT-5	>75	8.2%	-	
		7.50										
211.1	7.50		DS-7	9.00			9.00	SPT-6	>75	8.0%	-	
		9.00										
209.6	9.00		DS-8	10.50			10.50	SPT-7	>75	9.4%	-	
		10.50										
208.1	10.50											
		12.00										
206.6	12.00		DS-9	12.50			12.50	SPT-8	>75	10.3%	-	
		13.50										
205.1	13.50		DS-10	14.50	14.50	SPT-9	>75	10.5%	-			
		15.00										
203.6	15.00		DS-11	16.50	16.50	SPT-10	>75	12.5%	-			
		16.50										
202.1	16.50											
		18.00										
200.6	18.00		DS-12	18.50	18.50	SPT-11	>75	13.1%	-			
		19.50										

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).										
RL	Date of Drilling		BH No.	TERMINAL DEPTH (m)	WATER TABLE (m)	DRILL TYPE				
	25/08/2024-27/08/2024		B-3	30.00	1.90	ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values				
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD
213.9										
213.4	0.00		DS-1	0.50	Gravely sand					
		0.50								
212.4	0.50		DS-2	1.50						
		1.50								
210.9	1.50		DS-3	3.00	Highly weathered rock					
		3.00								
209.4	3.00		DS-4	4.50						
		4.50								
207.9	4.50		DS-5	6.00						
		6.00								
206.4	6.00		DS-6	7.50						
		7.50								
204.9	7.50		DS-7	9.00						
		9.00								
203.4	9.00		DS-8	10.50						
		10.50								
201.9	10.50									
		12.00								
200.4	12.00		DS-9	12.50						
		13.50								
198.9	13.50		DS-10	14.50						
		15.00								
197.4	15.00		DS-11	16.50						
		16.50								
195.9	16.50									
		18.00								
194.4	18.00		DS-12	18.50						
		19.50								
192.9	19.50		DS-13	20.50						
		21.00								
191.4	21.00									
		22.50								
189.9	22.50		DS-14	23.50						
		24.00								
188.4	24.00									
		25.50								
186.9	25.50		DS-15	26.50						
		27.00								
185.4	27.00									
		28.50								
183.9	28.50		DS-16	29.50						
		30.00								

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).											
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE			
	25/08/2024-26/08/2024		B-4	20.00		2.30		ROTARY DRILLING			
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values					
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD	
213.5											
213.0	0.00		DS-1	0.50	Gravely sand	0.50					
		0.50				SPT-1	13	19	-	-	
212.0	0.50		DS-2	1.50		1.50					
		1.50									
210.5	1.50		DS-3	3.00	Gravely sand	3.00	SPT-2	26	23	-	-
		3.00									
209.0	3.00		DS-4	4.50		4.50	SPT-3	33	25	-	-
		4.50									
207.5	4.50		DS-5	6.00	Highly weathered rock	6.00	SPT-4	>75		8.5%	-
		6.00									
206.0	6.00		DS-6	7.50		7.50	SPT-5	>75		9.2%	-
		7.50									
204.5	7.50		DS-7	9.00		9.00	SPT-6	>75		8.8%	-
		9.00									
203.0	9.00		DS-8	10.50		10.50	SPT-7	>75		10.4%	-
		10.50									
201.5	10.50										
		12.00									
200.0	12.00		DS-9	12.50		12.50	SPT-8	>75		11.4%	-
		13.50									
198.5	13.50		DS-10	14.50	14.50	SPT-9	>75		11.0%	-	
		15.00									
197.0	15.00		DS-11	16.50	16.50	SPT-10	>75		12.3%	-	
		16.50									
195.5	16.50										
		18.00									
194.0	18.00		DS-12	18.50	18.50	SPT-11	>75		14.4%	-	
		19.50									

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).											
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)	WATER TABLE (m)	DRILL TYPE					
	26/08/2024-28/08/2024		B-5	30.00	1.80	ROTARY DRILLING					
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values					
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD	
212.6	0.00										
212.1	0.50	0.50	DS-1	0.50	Gravely sand	0.50	SPT-1	14	20	-	-
211.1	0.50	1.50	DS-2	1.50		1.50					
209.6	1.50	3.00	DS-3	3.00		3.00	SPT-2	30	25	-	-
208.1	3.00	4.50	DS-4	4.50	Highly weathered rock	4.50	SPT-3	>75	9.4%	-	
206.6	4.50	6.00	DS-5	6.00		6.00	SPT-4	>75	9.8%	-	
205.1	6.00	7.50	DS-6	7.50		7.50	SPT-5	>75	11.2%	-	
203.6	7.50	9.00	DS-7	9.00		9.00	SPT-6	>75	10.5%	-	
202.1	9.00	10.50	DS-8	10.50		10.50	SPT-7	>75	12.3%	-	
200.6	10.50	12.00									
199.1	12.00	13.50	DS-9	12.50		12.50	SPT-8	>75	13.4%	-	
197.6	13.50	15.00	DS-10	14.50		14.50	SPT-9	>75	13.8%	-	
196.1	15.00	16.50	DS-11	16.50		16.50	SPT-10	>75	14.5%	-	
194.6	16.50	18.00									
193.1	18.00	19.50	DS-12	18.50		18.50	SPT-11	>75	13.9%	-	
191.6	19.50	21.00	DS-13	20.50		20.50	SPT-12	>75	15.2%	-	
190.1	21.00	22.50									
188.6	22.50	24.00	DS-14	23.50		23.50	SPT-13	>75	15.0%	-	
187.1	24.00	25.50									
185.6	25.50	27.00	DS-15	26.50		26.50	SPT-14	>75	15.5%	-	
184.1	27.00	28.50									
182.6	28.50	30.00	DS-16	29.50		29.50	SPT-15	>75	14.8%	-	

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).												
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE				
	26/08/2024-27/08/2024		B-6	20.00		2.10		ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values					
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD	
209.1												
208.6	0.00		DS-1	0.50	Gravelly sand	SM	0.50	SPT-1	16	23	-	-
207.6	0.50		DS-2	1.50			1.50					
206.1	1.50		DS-3	3.00			3.00	SPT-2	21	20	-	-
204.6	3.00		DS-4	4.50			4.50	SPT-3	29	23	-	-
203.1	4.50		DS-5	6.00	Highly weathered rock		6.00	SPT-4	>75		7.4%	-
201.6	6.00		DS-6	7.50			7.50	SPT-5	>75		8.2%	-
200.1	7.50		DS-7	9.00			9.00	SPT-6	>75		9.2%	-
198.6	9.00		DS-8	10.50			10.50	SPT-7	>75		8.9%	-
197.1	10.50											
195.6	12.00		DS-9	12.50			12.50	SPT-8	>75		10.4%	-
194.1	13.50		DS-10	14.50			14.50	SPT-9	>75		11.2%	-
192.6	15.00		DS-11	16.50			16.50	SPT-10	>75		12.3%	-
191.1	16.50											
189.6	18.00		DS-12	18.50			18.50	SPT-11	>75		13.9%	-

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).													
FL	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE					
	27/08/2024-29/08/2024		B-7	30.00		1.90		ROTARY DRILLING					
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values						
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD		
211.3	0.00												
210.8		0.50	DS-1	0.50	Gravely sand	SM	0.50						
209.8	0.50	1.50	DS-2	1.50			1.50	SPT-1	18	26	-	-	
208.3	1.50	3.00	DS-3	3.00	Highly weathered rock		3.00	SPT-2	>75		8.5%	-	
206.8	3.00	4.50	DS-4	4.50			4.50	SPT-3	>75		9.3%	-	
205.3	4.50	6.00	DS-5	6.00			6.00	SPT-4	>75		10.4%	-	
203.8	6.00	7.50	DS-6	7.50			7.50	SPT-5	>75		11.5%	-	
202.3	7.50	9.00	DS-7	9.00			9.00	SPT-6	>75		12.4%	-	
200.8	9.00	10.50	DS-8	10.50			10.50	SPT-7	>75		11.5%	-	
199.3	10.50	12.00											
197.8	12.00	13.50	DS-9	12.50			12.50	SPT-8	>75		9.8%	-	
196.3	13.50	15.00	DS-10	14.50			14.50	SPT-9	>75		11.2%	-	
194.8	15.00	16.50	DS-11	16.50			16.50	SPT-10	>75		13.5%	-	
193.3	16.50	18.00											
191.8	18.00	19.50	DS-12	18.50			18.50	SPT-11	>75		14.2%	-	
190.3	19.50	21.00	DS-13	20.50			20.50	SPT-12	>75		15.9%	-	
188.8	21.00	22.50											
187.3	22.50	24.00	DS-14	23.50			23.50	SPT-13	>75		15.3%	-	
185.8	24.00	25.50											
184.3	25.50	27.00	DS-15	26.50			26.50	SPT-14	>75		14.4%	-	
182.8	27.00	28.50											
181.3	28.50	30.00	DS-16	29.50			29.50	SPT-15	>75		14.8%	-	

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).												
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE				
	27/08/2024-28/08/2024		B-8	20.00		2.25		ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values					
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD	
219.1	0.00											
218.6		0.50	DS-1	0.50	Gravelly sand			0.50				
	0.50							SPT-1	13	19	-	-
217.6		1.50	DS-2	1.50				1.50				
216.1	1.50		DS-3	3.00				SPT-2	25	22	-	-
214.6		3.00						SPT-3	34	25	-	-
214.6	3.00		DS-4	4.50			4.50	SPT-3	34	25	-	
	4.50		DS-5	6.00			6.00	SPT-4	41	27	-	
213.1		6.00										
211.6	6.00		DS-6	7.50	Highly weathered rock			7.50	SPT-5	>75	8.1%	-
	7.50		DS-7	9.00				9.00	SPT-6	>75	7.5%	-
210.1		9.00						10.50	SPT-7	>75	7.9%	-
208.6	9.00		DS-8	10.50								
207.1	10.50											
	12.00		DS-9	12.50				12.50	SPT-8	>75	9.6%	-
205.6		13.50						14.50	SPT-9	>75	10.4%	-
204.1	13.50		DS-10	14.50								
	15.00		DS-11	16.50				16.50	SPT-10	>75	11.2%	-
202.6		16.50										
201.1	16.50											
	18.00		DS-12	18.50	18.50	SPT-11	>75	13.5%	-			
199.6		19.50										

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).										
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)	WATER TABLE (m)	DRILL TYPE				
	28/08/2024-30/08/2024		B-9	30.00	2.30	ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values				
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD
214.5	0.00									
214.0	0.50		DS-1	0.50	Gravely sand	0.50				
213.0	1.50		DS-2	1.50		1.50	SPT-1	20	29	-
211.5	3.00		DS-3	3.00		3.00	SPT-2	38	30	-
210.0	4.50		DS-4	4.50	Highly weathered rock	4.50	SPT-3	>75	7.6%	-
208.5	6.00		DS-5	6.00		6.00	SPT-4	>75	8.4%	-
207.0	7.50		DS-6	7.50		7.50	SPT-5	>75	9.3%	-
205.5	9.00		DS-7	9.00		9.00	SPT-6	>75	8.9%	-
204.0	10.50		DS-8	10.50		10.50	SPT-7	>75	10.5%	-
202.5	12.00									
201.0	13.50		DS-9	12.50		12.50	SPT-8	>75	10.4%	-
199.5	15.00		DS-10	14.50		14.50	SPT-9	>75	11.5%	-
198.0	16.50		DS-11	16.50		16.50	SPT-10	>75	12.3%	-
196.5	18.00									
195.0	19.50		DS-12	18.50		18.50	SPT-11	>75	13.6%	-
193.5	21.00		DS-13	20.50		20.50	SPT-12	>75	14.5%	-
192.0	22.50									
190.5	24.00		DS-14	23.50		23.50	SPT-13	>75	13.9%	-
189.0	25.50									
187.5	27.00		DS-15	26.50		26.50	SPT-14	>75	14.8%	-
186.0	28.50									
184.5	30.00		DS-16	29.50		29.50	SPT-15	>75	15.0%	-

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).											
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE			
	28/08/2024-29/08/2024		B-10	20.00		2.10		ROTARY DRILLING			
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values					
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD	
225.4											
224.9	0.00		DS-1	0.50	Gravely sand	SM	0.50				
		0.50					SPT-1	15	22	-	-
223.9	0.50		DS-2	1.50			1.50				
		1.50									
222.4	1.50		DS-3	3.00			3.00	SPT-2	23	21	-
		3.00									
220.9	3.00		DS-4	4.50			4.50	SPT-3	32	24	-
		4.50									
219.4	4.50		DS-5	6.00	Highly weathered rock		6.00	SPT-4	>75	8.8%	-
		6.00									
217.9	6.00		DS-6	7.50			7.50	SPT-5	>75	9.5%	-
		7.50									
216.4	7.50		DS-7	9.00			9.00	SPT-6	>75	10.3%	-
		9.00									
214.9	9.00		DS-8	10.50			10.50	SPT-7	>75	10.8%	-
		10.50									
213.4	10.50										
		12.00									
211.9	12.00		DS-9	12.50			12.50	SPT-8	>75	11.5%	-
		13.50									
210.4	13.50		DS-10	14.50	14.50	SPT-9	>75	11.6%	-		
		15.00									
208.9	15.00		DS-11	16.50	16.50	SPT-10	>75	12.3%	-		
		16.50									
207.4	16.50										
		18.00									
205.9	18.00		DS-12	18.50	18.50	SPT-11	>75	14.2%	-		
		19.50									

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).												
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE				
	29/08/2024-31/08/2024		B-11	30.00		2.50		ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values					
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD	
221.4												
	0.00		DS-1	0.50	Gravely sand	SM	0.50					
220.9		0.50					1.50	SPT-1	18	26	-	-
219.9	0.50		DS-2	1.50								
	1.50						3.00	SPT-2	35	28	-	-
218.4		3.00	DS-3	3.00								
	3.00		DS-4	4.50	Highly weathered rock		4.50	SPT-3	>75		7.1%	-
216.9		4.50					6.00	SPT-4	>75		8.4%	-
	4.50		DS-5	6.00								
215.4		6.00					7.50	SPT-5	>75		8.8%	-
213.9		7.50	DS-6	7.50								
	7.50		DS-7	9.00			9.00	SPT-6	>75		9.5%	-
212.4		9.00					10.50	SPT-7	>75		10.1%	-
210.9		10.50	DS-8	10.50								
	10.50											
209.4		12.00					12.50	SPT-8	>75		10.5%	-
	12.00		DS-9	12.50								
207.9		13.50					14.50	SPT-9	>75		11.5%	-
	13.50		DS-10	14.50								
206.4		15.00					16.50	SPT-10	>75		13.4%	-
	15.00		DS-11	16.50								
204.9		16.50										
	16.50											
203.4		18.00			18.50	SPT-11	>75		14.4%	-		
	18.00		DS-12	18.50								
201.9		19.50			20.50	SPT-12	>75		14.7%	-		
	19.50		DS-13	20.50								
200.4		21.00										
	21.00											
198.9		22.50										
	22.50		DS-14	23.50	23.50	SPT-13	>75		15.2%	-		
197.4		24.00										
	24.00											
195.9		25.50										
	25.50		DS-15	26.50	26.50	SPT-14	>75		15.7%	-		
194.4		27.00										
	27.00											
192.9		28.50										
	28.50		DS-16	29.50	29.50	SPT-15	>75		14.8%	-		
191.4		30.00										

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).										
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE		
	29/08/2024-30/08/2024		B-12	20.00		1.70		ROTARY DRILLING		
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values				
213.3	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD
	0.00		DS-1	0.50	Gravely sand	0.50				
212.8		0.50				SPT-1	16	23	-	-
	0.50		DS-2	1.50		1.50				
211.8		1.50								
	1.50		DS-3	3.00		3.00	SPT-2	25	22	-
210.3		3.00								
	3.00		DS-4	4.50	Highly weathered rock	4.50	SPT-3	>75	8.4%	-
208.8		4.50								
	4.50		DS-5	6.00		6.00	SPT-4	>75	10.2%	-
207.3		6.00								
	6.00		DS-6	7.50		7.50	SPT-5	>75	9.4%	-
205.8		7.50								
	7.50		DS-7	9.00		9.00	SPT-6	>75	8.8%	-
204.3		9.00								
	9.00		DS-8	10.50		10.50	SPT-7	>75	9.6%	-
202.8		10.50								
	10.50									
201.3		12.00								
	12.00		DS-9	12.50	12.50	SPT-8	>75	10.8%	-	
199.8		13.50								
	13.50		DS-10	14.50	14.50	SPT-9	>75	11.5%	-	
198.3		15.00								
	15.00		DS-11	16.50	16.50	SPT-10	>75	12.4%	-	
196.8		16.50								
	16.50									
195.3		18.00								
	18.00		DS-12	18.50	18.50	SPT-11	>75	12.9%	-	
193.8		19.50								

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).												
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE				
	30/08/2024-01/09/2024		B-13	30.00		2.50		ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA			SPT 'N' Values				
216.5	FROM	TO						SPT No.s	Observed	Corrected	Core recovery	RQD
216.0	0.00		DS-1	0.50	Gravely sand	SM	0.50					
215.0	0.50	0.50		1.50			SPT-1	16	23	-	-	
213.5	1.50	1.50		3.00			SPT-2	36	29	-	-	
212.0	3.00		DS-4	4.50	Highly weathered rock		4.50	SPT-3	>75		9.1%	-
210.5	4.50	4.50	DS-5	6.00			6.00	SPT-4	>75		8.5%	-
209.0	6.00	6.00	DS-6	7.50			7.50	SPT-5	>75		10.2%	-
207.5	7.50	7.50	DS-7	9.00			9.00	SPT-6	>75		9.4%	-
206.0	9.00	9.00	DS-8	10.50			10.50	SPT-7	>75		11.4%	-
204.5	10.50											
203.0	12.00		DS-9	12.50			12.50	SPT-8	>75		12.3%	-
201.5	13.50		DS-10	14.50			14.50	SPT-9	>75		14.5%	-
200.0	15.00		DS-11	16.50			16.50	SPT-10	>75		12.8%	-
198.5	16.50											
197.0	18.00		DS-12	18.50			18.50	SPT-11	>75		13.3%	-
195.5	19.50		DS-13	20.50			20.50	SPT-12	>75		14.5%	-
194.0	21.00											
192.5	22.50		DS-14	23.50			23.50	SPT-13	>75		15.2%	-
191.0	24.00											
189.5	25.50		DS-15	26.50			26.50	SPT-14	>75		13.8%	-
188.0	27.00											
186.5	28.50		DS-16	29.50	29.50	SPT-15	>75		15.7%	-		

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).										
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)	WATER TABLE (m)	DRILL TYPE				
	31/08/2024-01/08/2024		B-14	20.00	2.60	ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values				
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD
223.4	0.00									
222.9		0.50	DS-1	0.50	Gravely sand	SPT-1	14	20	-	-
221.9	0.50	1.50	DS-2	1.50						
220.4	1.50	3.00	DS-3	3.00	Highly weathered rock	SPT-2	>75	8.2%	-	-
218.9	3.00	4.50	DS-4	4.50		SPT-3	>75	9.8%	-	-
217.4	4.50	6.00	DS-5	6.00		SPT-4	>75	10.5%	-	-
215.9	6.00	7.50	DS-6	7.50		SPT-5	>75	11.5%	-	-
214.4	7.50	9.00	DS-7	9.00		SPT-6	>75	12.3%	-	-
212.9	9.00	10.50	DS-8	10.50		SPT-7	>75	9.6%	-	-
211.4	10.50	12.00								
209.9	12.00	13.50	DS-9	12.50		SPT-8	>75	10.8%	-	-
208.4	13.50	15.00	DS-10	14.50		SPT-9	>75	11.5%	-	-
206.9	15.00	16.50	DS-11	16.50		SPT-10	>75	12.0%	-	-
205.4	16.50	18.00								
203.9	18.00	19.50	DS-12	18.50		SPT-11	>75	14.3%	-	-

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).											
TR	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE			
	31/08/2024-02/09/2024		B-15	30.00		2.80		ROTARY DRILLING			
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values				
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD
217.6	0.00		DS-1	0.50	Gravelly sand	SMA					
217.1		0.50						SPT-1	18	26	-
216.1	0.50	1.50	DS-2	1.50							
214.6	1.50	3.00	DS-3	3.00			SPT-2	32	26	-	-
213.1	3.00		DS-4	4.50	Highly weathered rock		4.50	SPT-3	>75	8.3%	-
211.6	4.50		DS-5	6.00			6.00	SPT-4	>75	9.3%	-
210.1	6.00		DS-6	7.50			7.50	SPT-5	>75	10.4%	-
208.6	7.50		DS-7	9.00			9.00	SPT-6	>75	8.3%	-
207.1	9.00		DS-8	10.50			10.50	SPT-7	>75	9.8%	-
205.6	10.50										
204.1	12.00		DS-9	12.50			12.50	SPT-8	>75	10.5%	-
202.6	13.50		DS-10	14.50			14.50	SPT-9	>75	11.3%	-
201.1	15.00		DS-11	16.50			16.50	SPT-10	>75	12.4%	-
199.6	16.50										
198.1	18.00		DS-12	18.50			18.50	SPT-11	>75	11.6%	-
196.6	19.50		DS-13	20.50			20.50	SPT-12	>75	12.5%	-
195.1	21.00										
193.6	22.50		DS-14	23.50			23.50	SPT-13	>75	13.4%	-
192.1	24.00										
190.6	25.50		DS-15	26.50			26.50	SPT-14	>75	14.2%	-
189.1	27.00										
187.6	28.50		DS-16	29.50	29.50	SPT-15	>75	14.8%	-		
	30.00										

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).											
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE			
	01/09/2024-02/09/2024		B-16	20.00		2.20		ROTARY DRILLING			
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values					
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD	
217.6											
217.1	0.00		DS-1	0.50	Gravely sand	0.50					
		0.50				SPT-1	16	23	-	-	
216.1	0.50		DS-2	1.50		1.50					
		1.50									
214.6	1.50		DS-3	3.00		3.00	SPT-2	30	25	-	
		3.00								-	
213.1	3.00		DS-4	4.50	Highly weathered rock	4.50	SPT-3	>75	9.2%	-	
		4.50									
211.6	4.50		DS-5	6.00		6.00	SPT-4	>75	8.3%	-	
		6.00									
210.1	6.00		DS-6	7.50		7.50	SPT-5	>75	7.4%	-	
		7.50									
208.6	7.50		DS-7	9.00		9.00	SPT-6	>75	9.1%	-	
		9.00									
207.1	9.00		DS-8	10.50		10.50	SPT-7	>75	10.6%	-	
		10.50									
205.6	10.50										
		12.00									
204.1	12.00		DS-9	12.50	12.50	SPT-8	>75	10.8%	-		
		13.50									
202.6	13.50		DS-10	14.50	14.50	SPT-9	>75	12.2%	-		
		15.00									
201.1	15.00		DS-11	16.50	16.50	SPT-10	>75	13.4%	-		
		16.50									
199.6	16.50										
		18.00									
198.1	18.00		DS-12	18.50	18.50	SPT-11	>75	15.4%	-		
		19.50									

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).												
P.L. (m)	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE				
	01/09/2024-03/09/2024		B-17	30.00		2.25		ROTARY DRILLING				
	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values					
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD	
219.2	0.00				Gravely sand	SM	0.50					
218.7	0.50	0.50	DS-1	0.50			1.50	SPT-1	19	28	-	-
217.7	1.50	1.50	DS-2	1.50			3.00	SPT-2	39	30	-	-
216.2	3.00	3.00	DS-3	3.00			4.50	SPT-3	>75		7.2%	-
214.7	4.50	4.50	DS-4	4.50	Highly weathered rock		6.00	SPT-4	>75		6.8%	-
213.2	6.00	6.00	DS-5	6.00			7.50	SPT-5	>75		8.4%	-
211.7	7.50	7.50	DS-6	7.50			9.00	SPT-6	>75		9.6%	-
210.2	9.00	9.00	DS-7	9.00			10.50	SPT-7	>75		10.2%	-
208.7	10.50	10.50	DS-8	10.50			12.00					
207.2	12.00	12.00					12.50	SPT-8	>75		15.6%	-
205.7	13.50	13.50	DS-9	12.50			14.50	SPT-9	>75		13.2%	-
204.2	15.00	15.00	DS-10	14.50			16.50	SPT-10	>75		14.8%	-
202.7	16.50	16.50	DS-11	16.50			18.00					
201.2	18.00	18.00					18.50	SPT-11	>75		13.2%	-
199.7	19.50	19.50	DS-12	18.50			20.50	SPT-12	>75		12.7%	-
198.2	21.00	21.00	DS-13	20.50			22.50					
196.7	22.50	22.50					23.50	SPT-13	>75		11.8%	-
195.2	24.00	24.00	DS-14	23.50			25.50					
193.7	25.50	25.50					26.50	SPT-14	>75		14.3%	-
192.2	27.00	27.00	DS-15	26.50			28.50					
190.7	28.50	28.50			29.50	SPT-15	>75		13.8%	-		
189.2	30.00	30.00	DS-16	29.50								

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).										
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)	WATER TABLE (m)	DRILL TYPE				
	02/09/2024-03/09/2024		B-18	20.00	2.00	ROTARY DRILLING				
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values				
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD
215.7	0.00									
215.2		0.50	DS-1	0.50	Gravely sand	0.50				
	0.50					SPT-1	14	20	-	-
214.2		1.50	DS-2	1.50		1.50				
	1.50									
212.7		3.00	DS-3	3.00	Highly weathered rock	3.00	SPT-2	28	24	-
	3.00					4.50	SPT-3	>75	7.5%	-
211.2		4.50	DS-4	4.50		6.00	SPT-4	>75	7.9%	-
	4.50					7.50	SPT-5	>75	10.2%	-
209.7		6.00	DS-5	6.00		9.00	SPT-6	>75	11.4%	-
	6.00					10.50	SPT-7	>75	12.3%	-
208.2		7.50	DS-6	7.50		12.50	SPT-8	>75	11.8%	-
	7.50					14.50	SPT-9	>75	12.6%	-
206.7		9.00	DS-7	9.00		16.50	SPT-10	>75	14.3%	-
	9.00					18.50	SPT-11	>75	13.8%	-
205.2		10.50	DS-8	10.50						
	10.50									
203.7		12.00								
	12.00									
202.2		13.50	DS-9	12.50						
	13.50									
200.7		15.00	DS-10	14.50						
	15.00									
199.2		16.50	DS-11	16.50						
	16.50									
197.7		18.00								
	18.00									
196.2		19.50	DS-12	18.50						

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).														
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE						
	04/09/2024-06/09/2024		B-19	30.00		2.45		ROTARY DRILLING						
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA		SPT 'N' Values							
	FROM	TO					SPT No.s	Observed	Corrected	Core recovery	RQD			
211.0	0.00		DS-1	0.50	Gravely sand	SM								
210.5	0.50	0.50						SPT-1	12	17	-	-		
209.5	1.50	1.50					DS-2	1.50						
208.0	1.50	3.00					DS-3	3.00		SPT-2	23	21	-	-
206.5	3.00	4.50					DS-4	4.50		SPT-3	38	27	-	-
	4.50		DS-5	6.00	Highly weathered rock	SM		SPT-4	>75	9.6%	-			
205.0	6.00							7.50	SPT-5	>75	10.3%	-		
203.5	7.50							9.00	SPT-6	>75	12.4%	-		
202.0	9.00							10.50	SPT-7	>75	13.6%	-		
200.5	10.50													
199.0	12.00													
197.5	13.50						DS-9	12.50		SPT-8	>75	12.7%	-	
196.0	15.00						DS-10	14.50		SPT-9	>75	11.5%	-	
194.5	16.50						DS-11	16.50		SPT-10	>75	13.7%	-	
193.0	18.00													
191.5	19.50						DS-12	18.50		SPT-11	>75	15.4%	-	
190.0	21.00						DS-13	20.50		SPT-12	>75	15.8%	-	
188.5	22.50													
187.0	24.00						DS-14	23.50		SPT-13	>75	16.4%	-	
185.5	25.50													
184.0	27.00						DS-15	26.50		SPT-14	>75	14.8%	-	
182.5	28.50													
181.0	30.00		DS-16	29.50		SPT-15	>75	15.0%	-					

Note: (-) * refer to nil in Core recovery & RQD column's

Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).										
R.L	Date of Drilling		BH No.	TERMINAL DEPTH (m)		WATER TABLE (m)		DRILL TYPE		
	04/09/2024-05/09/2024		B-20	20.00		2.10		ROTARY DRILLING		
(m)	DRILL DEPTH (m)		SAMPLE NUMBER	DEPTH OF SAMPLE IN M	DESCRIPTION OF STRATA	SPT 'N' Values				
	FROM	TO				SPT No.s	Observed	Corrected	Core recovery	RQD
212.7										
212.2	0.00		DS-1	0.50	Gravely sand	0.50				
		0.50				SPT-1	16	23	-	-
211.2	0.50		DS-2	1.50						
		1.50								
209.7	1.50		DS-3	3.00		3.00	SPT-2	30	25	-
		3.00								
208.2	3.00		DS-4	4.50	Highly weathered rock	4.50	SPT-3	>75	7.4%	-
		4.50								
206.7	4.50		DS-5	6.00		6.00	SPT-4	>75	6.5%	-
		6.00								
205.2	6.00		DS-6	7.50		7.50	SPT-5	>75	8.8%	-
		7.50								
203.7	7.50		DS-7	9.00		9.00	SPT-6	>75	9.2%	-
		9.00								
202.2	9.00		DS-8	10.50		10.50	SPT-7	>75	10.3%	-
		10.50								
200.7	10.50									
		12.00								
199.2	12.00		DS-9	12.50	12.50	SPT-8	>75	9.7%	-	
		13.50								
197.7	13.50		DS-10	14.50	14.50	SPT-9	>75	10.5%	-	
		15.00								
196.2	15.00		DS-11	16.50	16.50	SPT-10	>75	11.3%	-	
		16.50								
194.7	16.50									
		18.00								
193.2	18.00		DS-12	18.50	18.50	SPT-11	>75	12.5%	-	
		19.50								

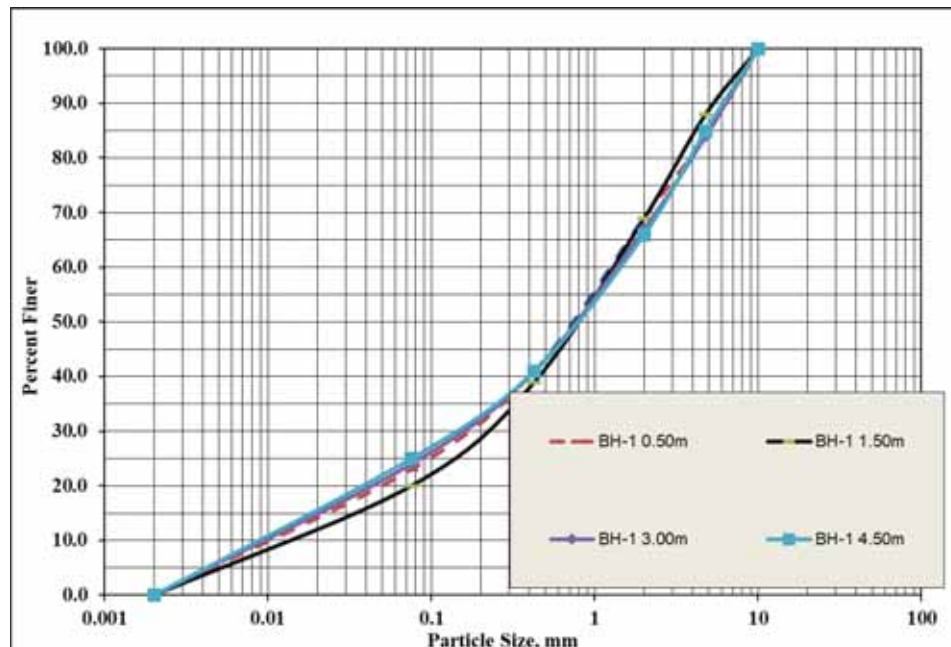
Note: (-) * refer to nil in Core recovery & RQD column's

APPENDIX – C

RESULTS OF LAB TESTS

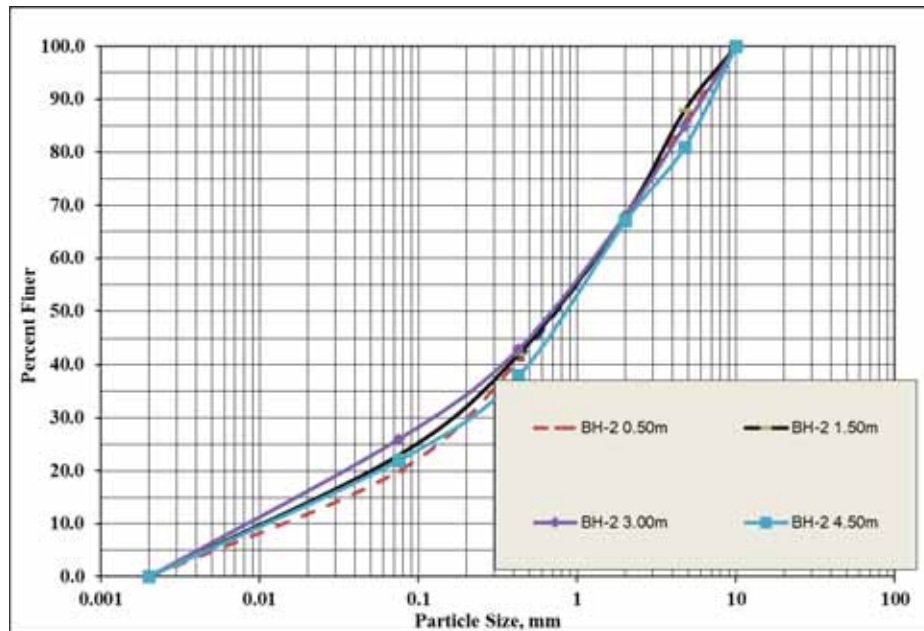
Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																								
Table 2: RESULTS OF LAB TESTS																	Water Level: 2.10M							
		Bh No.:		1			Soil Classification								Shear Parameters									
		Grain Size Analysis (%)						Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
Sample Depth	Sample Type	Clay	Silt	Fine Sand	Med. Sand	Coarse Sand		Gravel	Gs	y	Yd		m	LL	PL									PI
(m)			<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%							
0.50	DS-1	0.0	23.0	18.0	28.0	15.0	16.0	SM	2.64	1.741	1.608	0.64	8.25	NP	NP	NP	DIR	0.00	28.9	1.43	0.25	0.10	13.31	0.42
1.50	DS-2	0.0	20.0	19.0	30.0	19.0	12.0	SM	2.64	1.765	1.601	0.65	10.25	NP	NP	NP	DIR	0.00	29.1	1.38	0.30	1.11	12.31	0.57
3.00	DS-3	0.0	24.0	17.0	26.0	17.0	16.0	SM	2.63	1.794	1.621	0.62	10.65	NP	NP	NP	DIR	0.00	29.0	1.55	0.25	0.10	14.67	0.37
4.50	DS-4	0.0	25.0	16.0	25.0	19.0	15.0	SM	2.64	1.799	1.615	0.63	11.36	NP	NP	NP	DIR	0.00	29.9	1.59	0.24	0.10	15.14	0.35
TxUU= Triaxial Test																								

Grain Size Analysis Graph



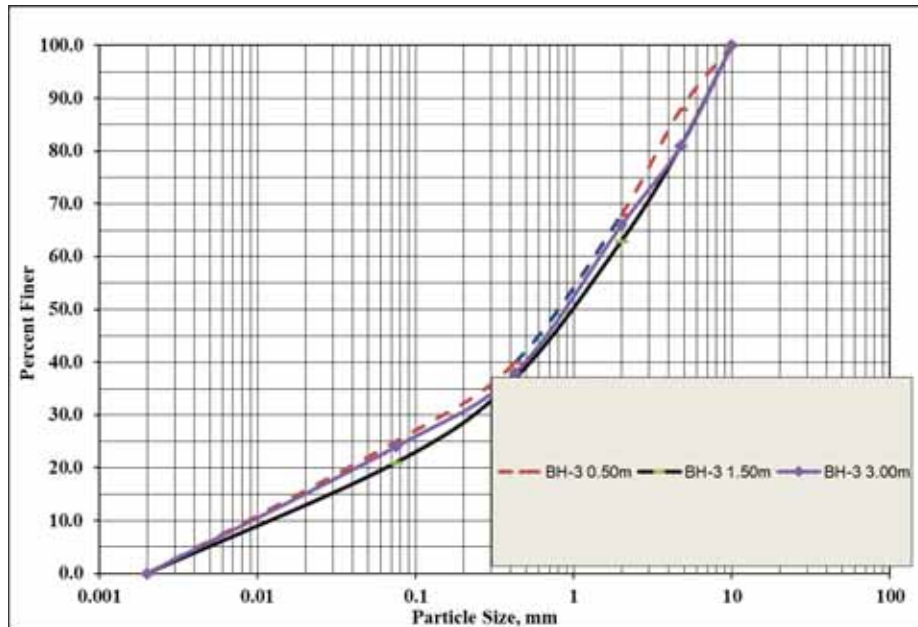
Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																									
Table 2: RESULTS OF LAB TESTS																			Water Level: 2.40M						
		Bh No.:			2			Soil Classification									Shear Parameters								
		Grain Size Analysis (%)							Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel							LL	PL	PI									
Sample Depth									G _s	γ	Y _d		m	LL	PL	PI									
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u	C _c	
0.50	DS-1	0.0	20.0	21.0	27.0	18.0	14.0	SM	2.65	1.738	1.616	0.64	7.58	NP	NP	NP	DIR	0.00	29	1.49	0.30	0.11	13.29	0.53	
1.50	DS-2	0.0	23.0	19.0	26.0	20.0	12.0	SM	2.64	1.758	1.611	0.64	9.15	NP	NP	NP	DIR	0.00	29.5	1.34	0.26	0.10	12.48	0.49	
3.00	DS-3	0.0	26.0	17.0	25.0	17.0	15.0	SM	2.64	1.789	1.623	0.63	10.25	NP	NP	NP	DIR	0.00	29.6	1.34	0.21	0.10	12.94	0.33	
4.50	DS-4	0.0	22.0	16.0	29.0	14.0	19.0	SM	2.63	1.791	1.618	0.63	10.68	NP	NP	NP	DIR	0.00	30.2	1.52	0.30	0.11	13.94	0.54	
TxUU= Triaxial Test NP= Non Plastic DIR = Direct Shear Test																									

Grain Size Analysis Graph



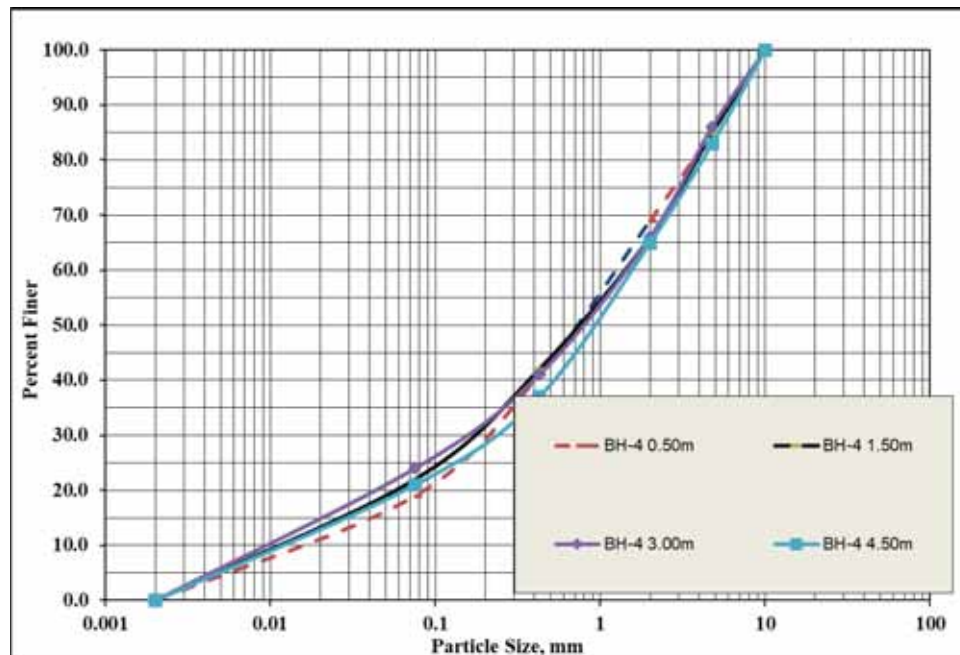
Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																								
Table 2: RESULTS OF LAB TESTS																		Water Level: 1.90M						
		Bh No.:		3				Soil Classification								Shear Parameters								
		Grain Size Analysis (%)							Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification				
Sample Depth		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel		Gs	γ	Yd		m	LL	PL	PI								
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	> 4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u	C _c
0.50	DS-1	0.0	25.0	15.0	28.0	20.0	12.0	SM	2.66	1.748	1.609	0.65	8.65	NP	NP	NP	DIR	0.00	28.7	1.33	0.24	0.10	12.80	0.42
1.50	DS-2	0.0	21.0	16.0	26.0	18.0	19.0	SM	2.65	1.774	1.624	0.63	9.25	NP	NP	NP	DIR	0.00	29.3	1.75	0.31	0.11	15.84	0.52
3.00	DS-3	0.0	24.0	14.0	28.0	15.0	19.0	SM	2.65	1.790	1.625	0.63	10.14	NP	NP	NP	DIR	0.00	29.5	1.55	0.27	0.11	14.61	0.47
TxUU= Triaxial Test																								

Grain Size Analysis Graph



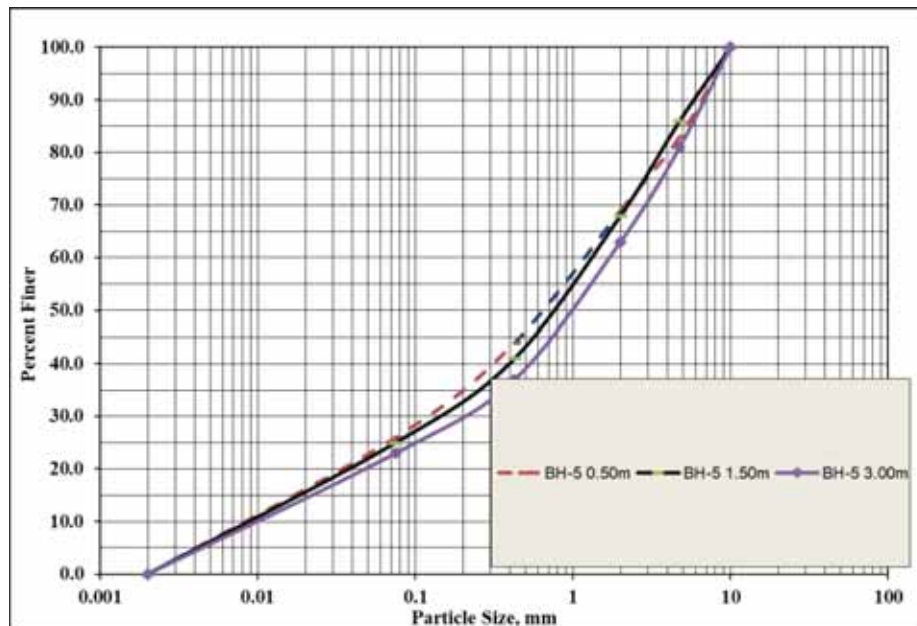
Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																									
Table 2: RESULTS OF LAB TESTS																		Water Level: 2.30M							
		Bh No.:				4		Soil Classification									Shear Parameters								
		Grain Size Analysis (%)							Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel		Gs	y	Yd		m	LL	PL	PI									
Sample Depth																									
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u	C _c	
0.50	DS-1	0.0	19.0	22.0	28.0	16.0	15.0	SM	2.63	1.729	1.587	0.66	8.93	NP	NP	NP	DIR	0.00	28.7	1.38	0.30	0.11	12.09	0.56	
1.50	DS-2	0.0	22.0	20.0	24.0	19.0	15.0	SM	2.64	1.749	1.601	0.65	9.25	NP	NP	NP	DIR	0.00	29.1	1.50	0.27	0.11	13.82	0.44	
3.00	DS-3	0.0	24.0	17.0	25.0	20.0	14.0	SM	2.64	1.776	1.616	0.63	9.88	NP	NP	NP	DIR	0.00	29.4	1.59	0.28	0.11	14.13	0.44	
4.50	DS-4	0.0	21.0	16.0	28.0	18.0	17.0	SM	2.65	1.789	1.624	0.63	10.14	NP	NP	NP	DIR	0.00	30	1.65	0.32	0.11	14.97	0.55	
TxUU= Triaxial Test																									

Grain Size Analysis Graph

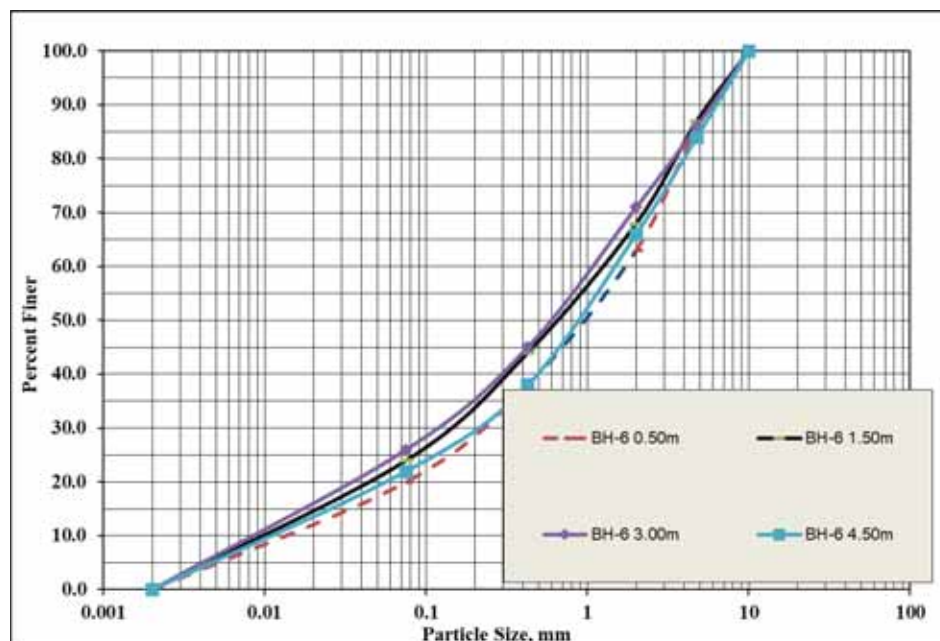


Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																									
Table 2: RESULTS OF LAB TESTS																		Water Level: 1.80M							
		Bh No.:		5				Soil Classification								Shear Parameters									
		Grain Size Analysis (%)							Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
Sample Depth		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel		Gs	γ	Yd		m	LL	PL	PI									
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	> 4.75 MM				g/cc	g/cc		%	%	%	%			Kg/cm²	Deg.	D60	D30	D10	C _u
0.50	DS-1	0.0	26.0	18.0	25.0	14.0	17.0	SM	2.64	1.729	1.603	0.65	7.85	NP	NP	NP	DIR	0.00	28.5		1.26	0.22	0.10	12.15	0.35
1.50	DS-2	0.0	25.0	16.0	27.0	18.0	14.0	SM	2.63	1.758	1.601	0.64	9.84	NP	NP	NP	DIR	0.00	29		1.40	0.24	0.10	13.36	0.40
3.00	DS-3	0.0	23.0	14.0	26.0	18.0	19.0	SM	2.64	1.788	1.632	0.62	9.56	NP	NP	NP	DIR	0.00	29.7		1.75	0.30	0.11	16.30	0.47
TxUU= Triaxial Test																									

Grain Size Analysis Graph

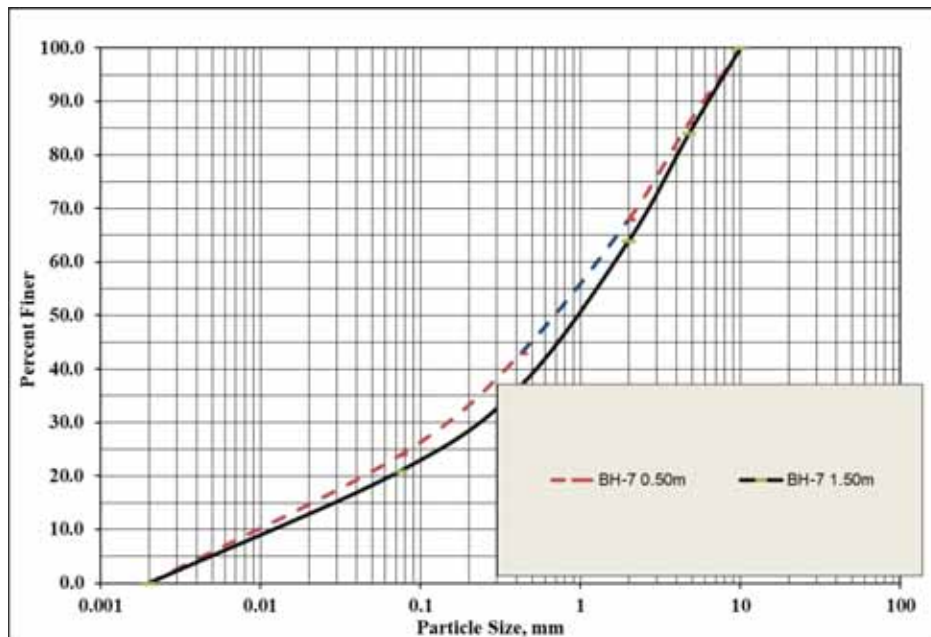


Grain Size Analysis Graph



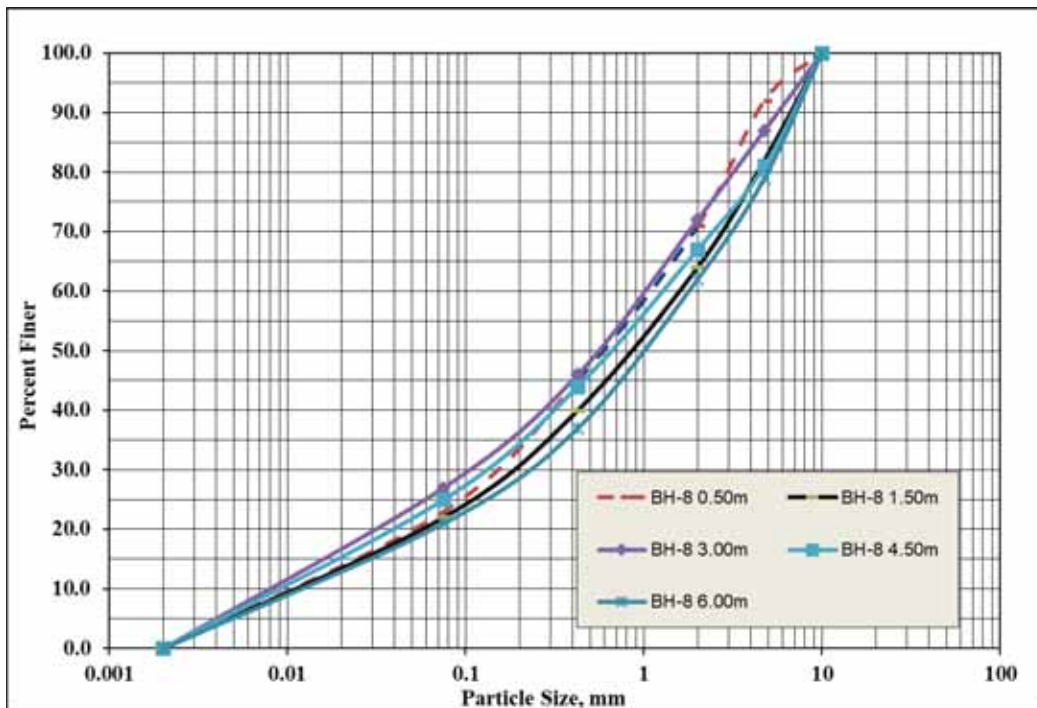
Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																								
Table 2: RESULTS OF LAB TESTS																		Water Level: 1.90M						
		Bh No.:		7		Soil Classification								Shear Parameters										
		Grain Size Analysis (%)						Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
Sample Depth		Clay	Silt	Fine Sand	Med. Sand		Coarse Sand	Gravel	Gs	y	Yd		m	LL	PL									PI
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u	C _c
0.50	DS-1	0.0	24.0	19.0	25.0	18.0	14.0	SM	2.65	1.738	1.600	0.66	8.65	NP	NP	NP	DIR	0.00	29.1	1.34	0.25	0.10	12.64	0.43
1.50	DS-2	0.0	21.0	16.0	27.0	20.0	16.0	SM	2.65	1.754	1.607	0.65	9.14	NP	NP	NP	DIR	0.00	29.4	1.67	0.32	0.11	15.10	0.54
TxUU= Triaxial Test NP= Non Plastic DIR = Direct Shear Test																								

Grain Size Analysis Graph

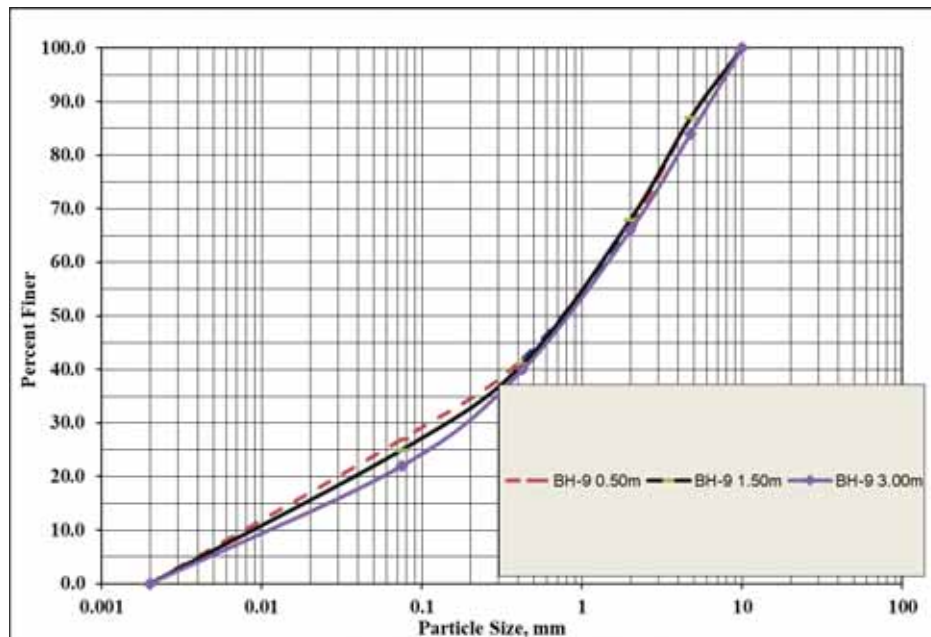


Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																								
Table 2: RESULTS OF LAB TESTS																		Water Level: 2.25M						
		Bh No.:				8		Soil Classification								Shear Parameters								
		Grain Size Analysis (%)							Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification				
									Gs	y	Yd		m	LL	PL	PI								
Sample Depth	Sample Type	Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel																	
(m)		<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%	Kg/cm ²	Deg.	D60	D30	D10	C _u	C _c	
0.50	DS-1	0.0	23.0	22.0	26.0	21.0	8.0	SM	2.63	1.728	1.608	0.64	7.45	NP	NP	NP	DIR	0.00	28.7	1.24	0.24	0.10	11.60	0.45
1.50	DS-2	0.0	22.0	18.0	24.0	18.0	18.0	SM	2.64	1.741	1.599	0.65	8.88	NP	NP	NP	DIR	0.00	29.1	1.70	0.28	0.11	15.60	0.43
3.00	DS-3	0.0	27.0	19.0	26.0	15.0	13.0	SM	2.64	1.761	1.627	0.62	8.25	NP	NP	NP	DIR	0.00	29.0	1.03	0.20	0.10	10.07	0.37
4.50	DS-4	0.0	25.0	19.0	23.0	14.0	19.0	SM	2.65	1.781	1.629	0.63	9.36	NP	NP	NP	DIR	0.00	29.9	1.42	0.23	0.10	13.58	0.36
6.00	DS-5	0.0	21.0	16.0	25.0	17.0	21.0	SM	2.65	1.811	1.651	0.61	9.69	NP	NP	NP	DIR	0.00	30.2	1.83	0.32	0.11	16.58	0.50
TxUU= Triaxial Test NP= Non Plastic DIR = Direct Shear Test																								

Grain Size Analysis Graph



Grain Size Analysis Graph



Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).

Table 2: RESULTS OF LAB TESTS

Water Level: 2.10M

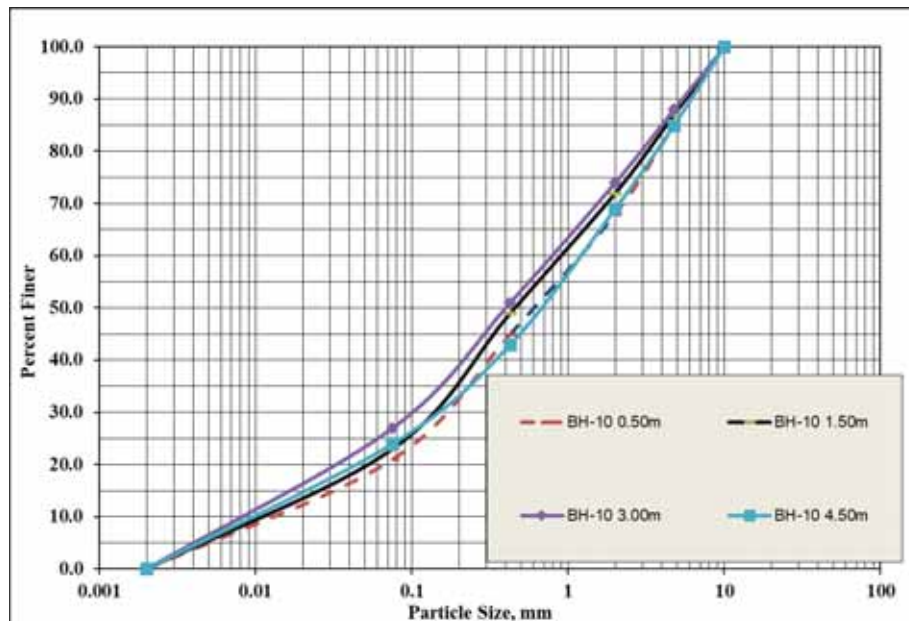
Sample Depth (m)	Sample Type	Grain Size Analysis (%)						Soil Classification	Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Shear Parameters		Soil classification				
		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel		Gs	γ	γ_d		m	LL	PL	PI		Cohesion C	Angle of Internal Friction					
		<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.					
0.50	DS-1	0.0	21.0	24.0	23.0	17.0	15.0	SM	2.66	1.721	1.603	0.66	7.36	NP	NP	NP	DIR	0.00	28.7	1.34	0.26	0.11	12.13	28.7
1.50	DS-2	0.0	23.0	26.0	23.0	15.0	13.0	SM	2.64	1.746	1.608	0.64	8.55	NP	NP	NP	DIR	0.00	29.3	1.01	0.23	0.10	9.42	0.48
3.00	DS-3	0.0	27.0	24.0	23.0	14.0	12.0	SM	2.63	1.789	1.649	0.59	8.48	NP	NP	NP	DIR	0.00	29.2	0.84	0.18	0.10	8.25	0.40
4.50	DS-4	0.0	24.0	19.0	26.0	16.0	15.0	SM	2.65	1.793	1.640	0.62	9.32	NP	NP	NP	DIR	0.00	29.9	1.26	0.25	0.10	11.87	0.46

TxUU= Triaxial Test

NP= Non Plastic

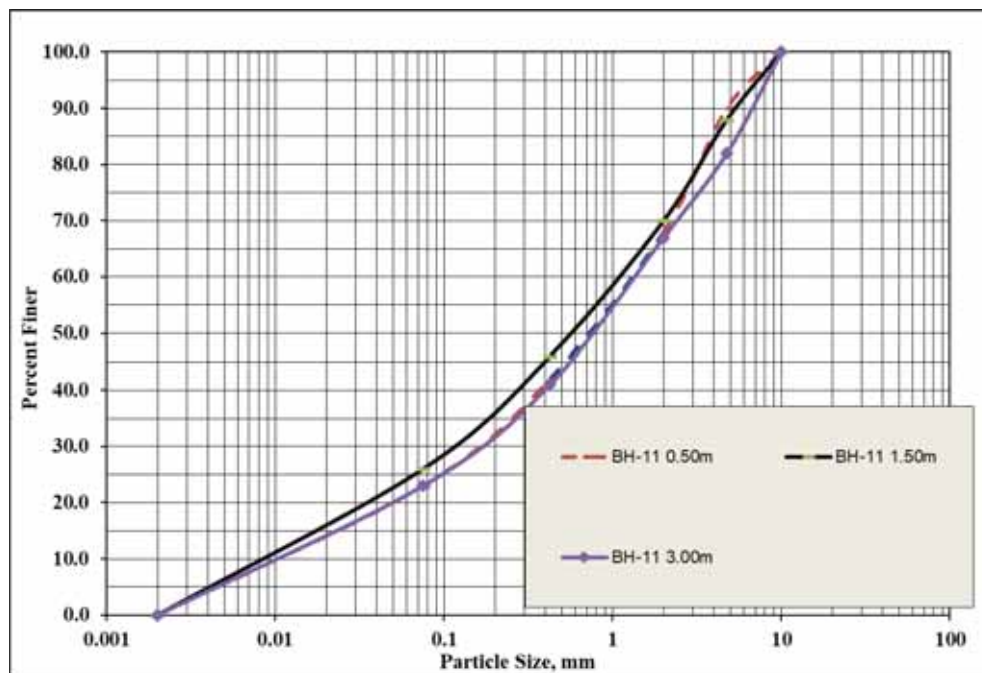
DIR = Direct Shear Test

Grain Size Analysis Graph

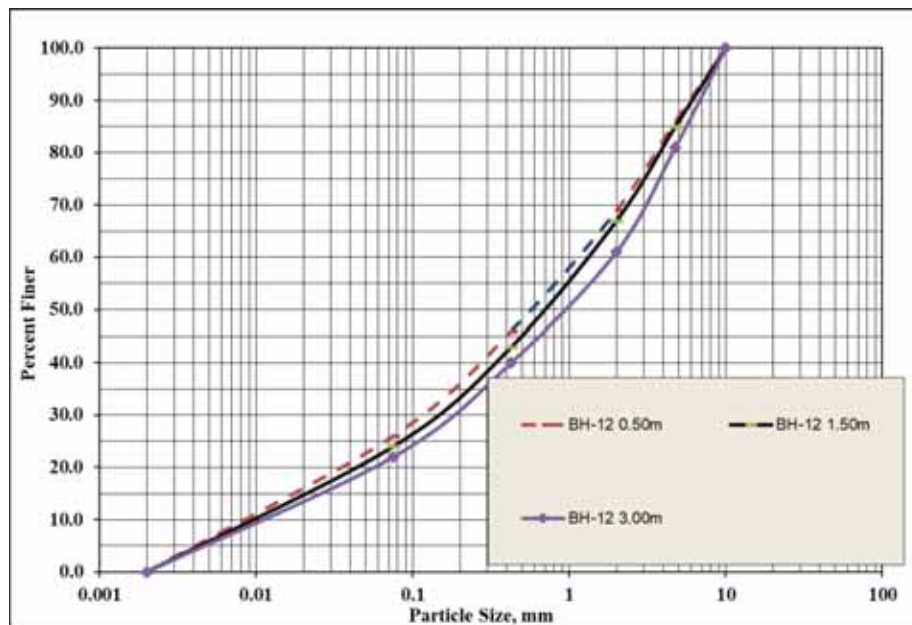


Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																									
Table 2: RESULTS OF LAB TESTS																	Water Level: 2.50M								
		Bh No.:			11			Soil Classification								Shear Parameters									
		Grain Size Analysis (%)							Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel		Gs	y	Yd		m	LL	PL	PI									
Sample Depth																									
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u	C _c	
0.50	DS-1	0.0	23.0	19.0	26.0	22.0	10.0	SM	2.64	1.738	1.603	0.65	8.45	NP	NP	NP	DIR	0.00	28.9	1.34	0.26	0.11	12.48	0.49	
1.50	DS-2	0.0	26.0	20.0	24.0	18.0	12.0	SM	2.63	1.766	1.616	0.63	9.31	NP	NP	NP	DIR	0.00	29.3	1.18	0.21	0.10	11.36	0.36	
3.00	DS-3	0.0	23.0	18.0	26.0	15.0	18.0	SM	2.64	1.801	1.650	0.60	9.14	NP	NP	NP	DIR	0.00	29.7	1.42	0.26	0.11	13.25	0.46	
TxUU= Triaxial Test NP= Non Plastic DIR = Direct Shear Test																									

Grain Size Analysis Graph



Grain Size Analysis Graph



Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).

Table 2: RESULTS OF LAB TESTS

Water Level: 2.50M

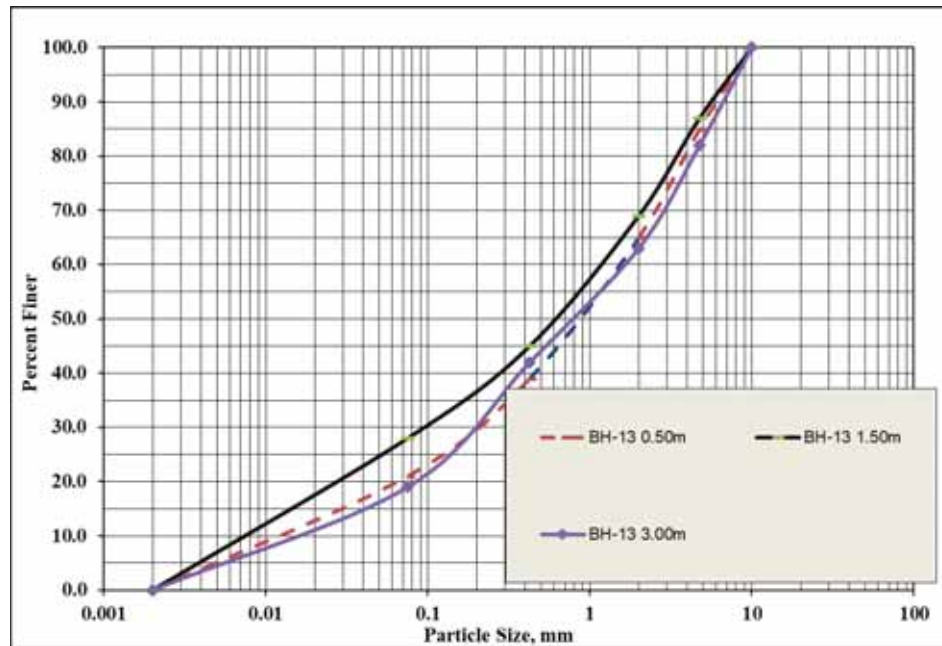
		Bh No.:		13		Soil Classification									Shear Parameters									
		Grain Size Analysis (%)						Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
Sample Depth	Sample Type	Clay	Silt	Fine Sand	Med. Sand		Coarse Sand	Gravel	Gs	γ	Yd		m	LL	PL									PI
(m)			<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u
0.50	DS-1	0.0	21.0	18.0	26.0	20.0	15.0	SM	2.66	1.731	1.612	0.65	7.36	NP	NP	NP	DIR	0.00	29.1	1.59	0.30	0.11	14.36	0.51
1.50	DS-2	0.0	28.0	17.0	24.0	18.0	13.0	SM	2.65	1.759	1.625	0.63	8.24	NP	NP	NP	DIR	0.00	29.8	1.18	0.19	0.10	11.59	0.31
3.00	DS-3	0.0	19.0	23.0	21.0	19.0	18.0	SM	2.64	1.793	1.640	0.61	9.36	NP	NP	NP	DIR	0.00	30.1	1.69	0.27	0.11	14.78	0.40
TxUU= Triaxial Test																								

TxUU= Triaxial Test

NP= Non Plastic

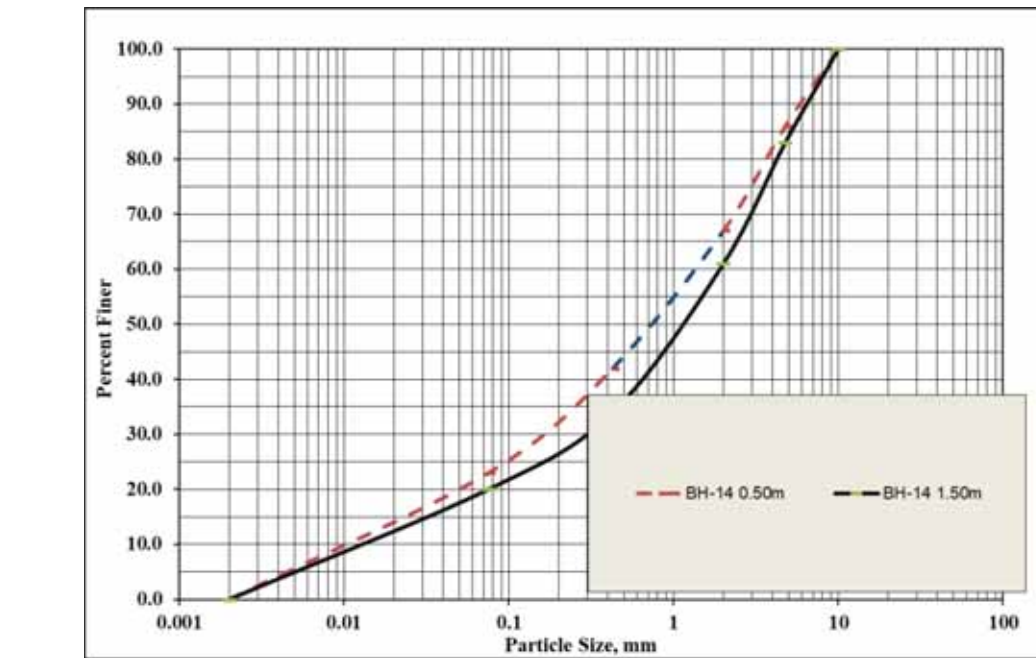
DIR = Direct Shear Test

Grain Size Analysis Graph



Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																								
Table 2: RESULTS OF LAB TESTS																	Water Level: 2.60M							
		Bh No.:		14		Soil Classification								Shear Parameters										
		Grain Size Analysis (%)						Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
Sample Depth	Sample Type	Clay	Silt	Fine Sand	Med. Sand		Coarse Sand	Gravel	Gs	y	Yd		m	LL	PL									PI
(m)			<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	> 4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u
0.50	DS-1	0.0	23.0	19.0	25.0	19.0	14.0	SM	2.66	1.746	1.623	0.64	7.55	NP	NP	NP	DIR	0.00	29.2	1.42	0.26	0.10	13.25	0.46
1.50	DS-2	0.0	20.0	14.0	27.0	22.0	17.0	SM	2.64	1.759	1.623	0.63	8.36	NP	NP	NP	DIR	0.00	29.5	1.91	0.36	0.11	17.04	0.61
TxUU= Triaxial Test																								

Grain Size Analysis Graph



Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).

Table 2: RESULTS OF LAB TESTS

Water Level: 2.80M

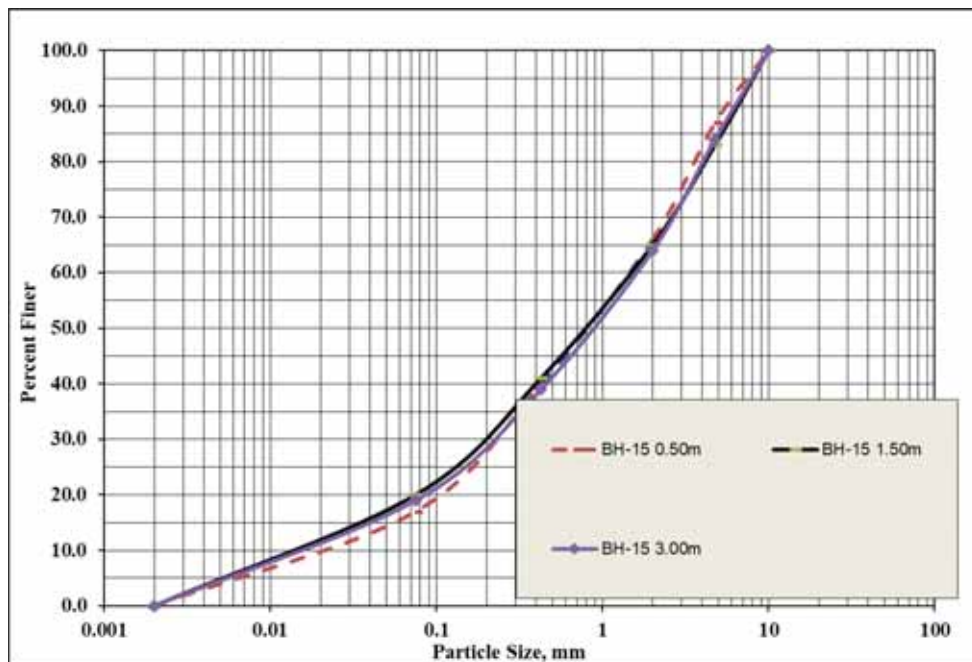
Sample Depth (m)	Sample Type	Grain Size Analysis (%)						Soil Classification	Sp. Gravity	Bulk Density g/cc	Dry Density g/cc	Void Ratio	Moisture Content %	Atterberg's Limits			Test Type	Cohesion C Kg/cm ²	Angle of Internal Friction Deg.	Shear Parameters				
		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel													Soil classification				
		<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM		G _s	γ	Y _d		m	LL	PL	PI				D ₆₀	D ₃₀	D ₁₀	C _u	C _c
0.50	DS-1	0.0	17.0	23.0	26.0	21.0	13.0	SM	2.63	1.727	1.609	0.63	7.36	NP	NP	NP	DIR	0.00	28.9	1.50	0.30	0.12	12.65	0.50
1.50	DS-2	0.0	20.0	21.0	24.0	18.0	17.0	SM	2.65	1.764	1.630	0.63	8.24	NP	NP	NP	DIR	0.00	29.3	1.59	0.28	0.11	14.13	0.45
3.00	DS-3	0.0	19.0	20.0	25.0	20.0	16.0	SM	2.65	1.789	1.636	0.62	9.36	NP	NP	NP	DIR	0.00	30.0	1.67	0.31	0.11	14.60	0.52

TxUU= Triaxial Test

NP= Non Plastic

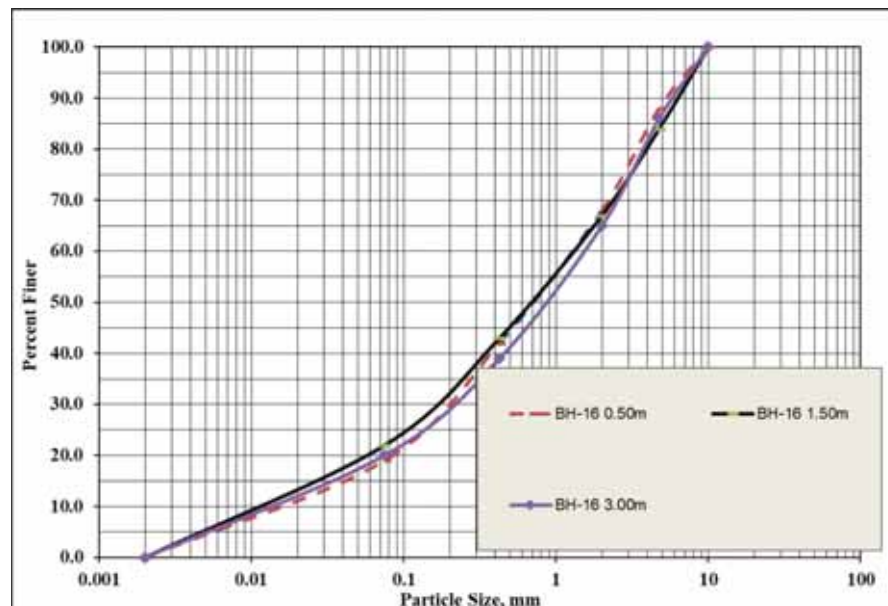
DIR = Direct Shear Test

Grain Size Analysis Graph



Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																								
Table 2: RESULTS OF LAB TESTS																		Water Level: 2.20M						
		Bh No.:		16		Soil Classification									Shear Parameters									
		Grain Size Analysis (%)						Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification					
Sample Depth		Clay	Silt	Fine Sand	Med. Sand		Coarse Sand	Gravel	Gs	y	Yd		m	LL	PL									PI
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM		g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u	C _c	
0.50	DS-1	0.0	19.0	23.0	26.0	20.0	12.0	SM	2.64	1.731	1.595	0.66	8.52	NP	NP	NP	DIR	0.00	29	1.34	0.27	0.11	11.74	0.49
1.50	DS-2	0.0	22.0	21.0	24.0	17.0	16.0	SM	2.64	1.781	1.632	0.62	9.11	NP	NP	NP	DIR	0.00	29.8	1.28	0.26	0.11	11.75	0.48
3.00	DS-3	0.0	20.0	19.0	26.0	21.0	14.0	SM	2.66	1.793	1.628	0.63	10.14	NP	NP	NP	DIR	0.00	30.1	1.48	0.32	0.11	13.22	0.60
TxUU= Triaxial Test NP= Non Plastic DIR = Direct Shear Test																								

Grain Size Analysis Graph



Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).

Table 2: RESULTS OF LAB TESTS

Water Level: 2.25M

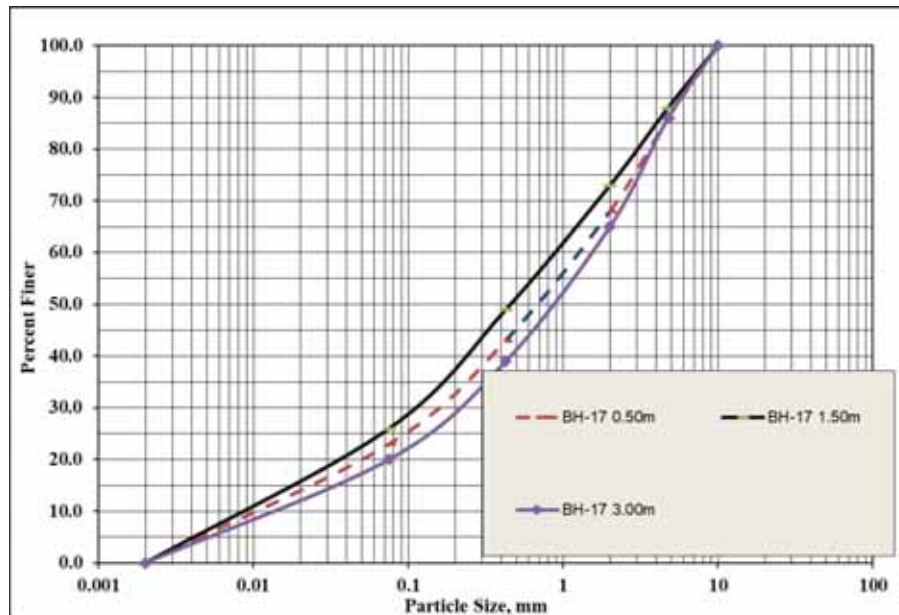
		Bh No.:		17		Soil Classification									Shear Parameters												
		Grain Size Analysis (%)						Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification								
Sample Depth		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel	Gs	y	Yd		m	LL	PL	PI												
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM		g/cc	g/cc		%	%	%	%												
0.50	DS-1	0.0	23.0	20.0	25.0	18.0	14.0	SM	2.65	1.735	1.603	0.65	8.23	NP	NP	NP	DIR	0.00	29.1		1.18	0.25	0.10	10.96	0.51		
1.50	DS-2	0.0	26.0	23.0	24.0	15.0	12.0	SM	2.64	1.776	1.623	0.63	9.45	NP	NP	NP	DIR	0.00	29.6		0.81	0.19	0.10	7.87	0.45		
3.00	DS-3	0.0	20.0	19.0	26.0	21.0	14.0	SM	2.63	1.803	1.626	0.62	10.88	NP	NP	NP	DIR	0.00	30.2		1.48	0.31	0.11	13.22	0.58		
TxUU= Triaxial Test																											

TxUU= Triaxial Test

NP= Non Plastic

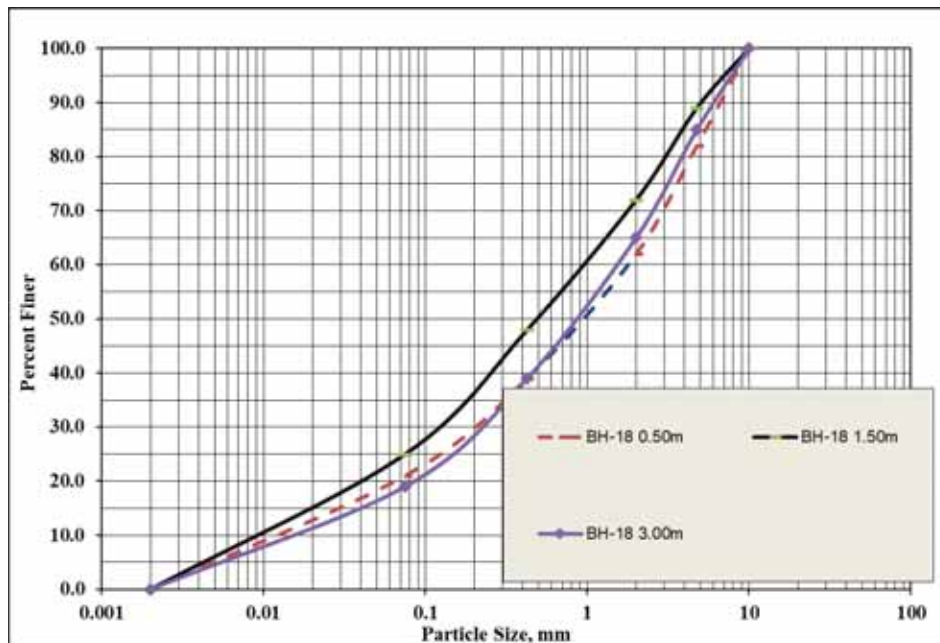
DIR = Direct Shear Test

Grain Size Analysis Graph



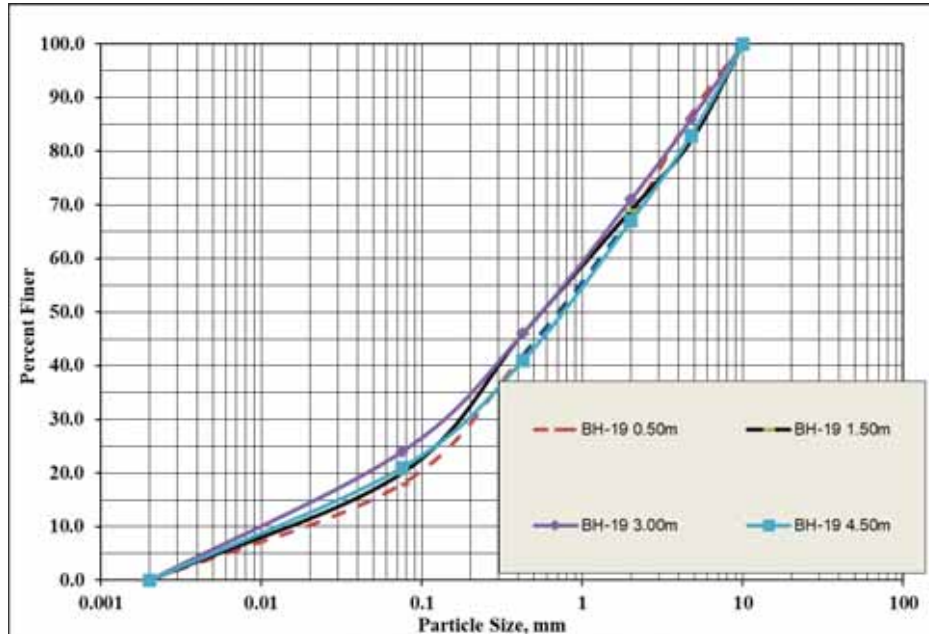
Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																								
Table 2: RESULTS OF LAB TESTS																	Water Level: 2.0M							
		Bh No.:		18				Soil Classification								Shear Parameters								
		Grain Size Analysis (%)							Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification				
Sample Depth		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel		Gs	γ	Yd		m	LL	PL	PI								
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D60	D30	D10	C _u	C _c
0.50	DS-1	0.0	21.0	18.0	23.0	20.0	18.0	SM	2.66	1.722	1.602	0.66	7.52	NP	NP	NP	DIR	0.00	29.3	1.79	0.30	0.11	16.21	0.45
1.50	DS-2	0.0	25.0	23.0	24.0	17.0	11.0	SM	2.64	1.754	1.619	0.63	8.36	NP	NP	NP	DIR	0.00	29.7	0.77	0.20	0.10	7.33	0.49
3.00	DS-3	0.0	19.0	20.0	26.0	20.0	15.0	SM	2.64	1.776	1.621	0.63	9.58	NP	NP	NP	DIR	0.00	30.0	1.59	0.31	0.11	13.88	0.53
TxUU= Triaxial Test																								

Grain Size Analysis Graph



Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).																								
Table 2: RESULTS OF LAB TESTS																	Water Level: 2.45M							
		Bh No.:		19				Soil Classification								Shear Parameters								
		Grain Size Analysis (%)							Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification				
Sample Depth	Sample Type	Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel		Gs	γ	Yd		m	LL	PL	PI								
(m)			<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM			g/cc	g/cc		%	%	%	%							
0.50	DS-1	0.0	18.0	24.0	26.0	19.0	13.0	SM	2.65	1.741	1.610	0.65	8.12	NP	NP	NP	DIR	0.00	28.5	1.34	0.27	0.11	11.52	0.48
1.50	DS-2	0.0	20.0	26.0	23.0	13.0	18.0	SM	2.64	1.759	1.619	0.63	8.63	NP	NP	NP	DIR	0.00	29	1.26	0.22	0.11	11.21	0.35
3.00	DS-3	0.0	24.0	22.0	25.0	15.0	14.0	SM	2.64	1.770	1.617	0.63	9.45	NP	NP	NP	DIR	0.00	29.8	1.10	0.23	0.10	10.42	0.45
4.50	DS-4	0.0	21.0	20.0	26.0	16.0	17.0	SM	2.63	1.793	1.632	0.61	9.88	NP	NP	NP	DIR	0.00	29.3	1.42	0.28	0.11	12.88	0.51
TxUU= Triaxial Test NP= Non Plastic DIR = Direct Shear Test																								

Grain Size Analysis Graph



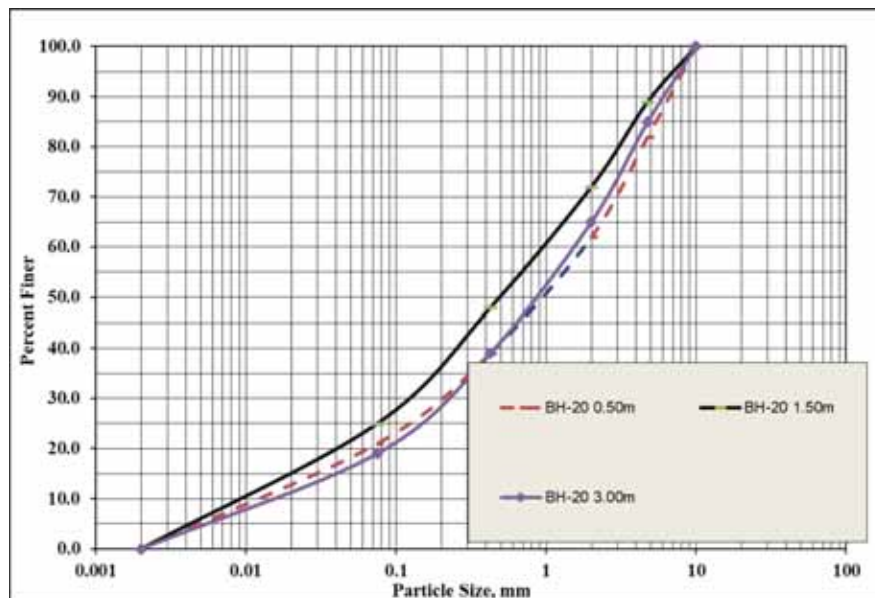
Geotechnical Investigations for High Ash Coal to Ammonium Nitrate Plant (MCL).

Table 2: RESULTS OF LAB TESTS

Water Level: 2.10M

		Bh No.:		20		Soil Classification									Shear Parameters										
		Grain Size Analysis (%)						Sp. Gravity	Bulk Density	Dry Density	Void Ratio	Moisture Content	Atterberg's Limits			Test Type	Cohesion C	Angle of Internal Friction	Soil classification						
								G _s	γ	Y _d		m	LL	PL	PI										
Sample Depth		Clay	Silt	Fine Sand	Med. Sand	Coarse Sand	Gravel			g/cc	g/cc		%	%	%	%		Kg/cm ²	Deg.	D ₆₀	D ₃₀	D ₁₀	C _u	C _c	
(m)	Sample Type	<0.002 MM	0.002 - 0.075	0.075 - 0.425	0.425 - 2.00	2.00 - 4.75	>4.75 MM																		
0.50	DS-1	0.0	21.0	18.0	23.0	20.0	18.0	SM	2.66	1.722	1.602	0.66	7.52	NP	NP	NP	DIR	0.00	29.3	1.83	0.30	0.11	16.58	0.44	
1.50	DS-2	0.0	25.0	23.0	24.0	17.0	11.0	SM	2.64	1.754	1.619	0.63	8.36	NP	NP	NP	DIR	0.00	29.7	1.01	0.20	0.10	9.65	0.40	
3.00	DS-3	0.0	19.0	20.0	26.0	20.0	15.0	SM	2.64	1.776	1.621	0.63	9.58	NP	NP	NP	DIR	0.00	30.0	1.59	0.31	0.11	13.88	0.53	
TxUU= Triaxial Test NP= Non Plastic DIR = Direct Shear Test																									

Grain Size Analysis Graph



APPENDIX – D

BEARING CAPACITY
CALCULATIONS

BEARING CAPACITY: SHEAR CRITERIA

SBC of Soil based on Shear Criteria																			
Sample Calculations								Type of Foundation = Isolated			Water Table Correction factor = 0.5								
Depth of Foundation, m	Size of Footing, m	Bulk Density of Soil, gm/cc	Cohesion 'c' t/m ²	Angle of Shearing Resistance 'φ' degree	Bearing Capacity Factors			Depth Factors			Shape Factors			Bearing Capacity BC1=2/3c.Nc.dc.sc.ic	Bearing Capacity BC2=g.D.(Nq-1).dq.sq.iq	Bearing Capacity BC3=0.5.g.B.Ng.dg.sg.ig.W'	Total Bearing Capacity BC=BC1+BC2+BC3	Net Safe Bearing Capacity S.B.C.(Net)=BC/FOS (Between Local and General Shear Failure)	
D	B	g	c	φ	Nc	Nq	Ng	dc	dq	dg	sc	sq	sg	BC1	BC2	BC3		T/m ²	
1.0	1.0	1.735	0.0	33.0	38.63	26.09	35.18	1.1	1.1	1.1	1.3	1.2	0.8	0.0	23.4	12.9	36.3	15	
2.0	1.0	1.735	0.0	33.0	38.63	26.09	35.18	1.2	1.1	1.1	1.3	1.2	0.8	0.0	49.2	13.6	62.8	25	
3.0	1.0	1.735	0.0	33.0	38.63	26.09	35.18	1.3	1.1	1.1	1.3	1.2	0.8	0.0	73.0	13.4	86.5	35	



BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING/ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 1													
4.50	-	6.00	219.700	1	3	8	10	7	-2	27	IV	POOR ROCK	65
6.00	-	7.50	218.200	1	3	8	10	7	-2	27	IV	POOR ROCK	62
7.50	-	9.00	216.700	1	3	8	10	7	-2	27	IV	POOR ROCK	60
9.00	-	10.50	215.200	1	3	8	10	7	-2	27	IV	POOR ROCK	67
12.00	-	13.50	212.200	1	3	8	10	7	-2	27	IV	POOR ROCK	69
13.50	-	15.00	210.700	1	3	8	10	7	-2	27	IV	POOR ROCK	65
15.00	-	16.50	209.200	1	3	8	10	7	-2	27	IV	POOR ROCK	64
18.00	-	19.50	206.200	1	3	8	10	7	-2	27	IV	POOR ROCK	63
19.50	-	21.00	204.700	1	3	8	10	7	-2	27	IV	POOR ROCK	62
22.50	-	24.00	201.700	1	3	8	10	7	-2	27	IV	POOR ROCK	71
25.50	-	27.00	198.700	1	3	8	10	7	-2	27	IV	POOR ROCK	60
28.50	-	30.00	195.700	1	3	8	10	7	-2	27	IV	POOR ROCK	67

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 2													
4.50	-	6.00	214.100	1	3	8	10	7	-2	27	IV	POOR ROCK	62
6.00	-	7.50	212.600	1	3	8	10	7	-2	27	IV	POOR ROCK	64
7.50	-	9.00	211.100	1	3	8	10	7	-2	27	IV	POOR ROCK	64
9.00	-	10.50	209.600	1	3	8	10	7	-2	27	IV	POOR ROCK	69
12.00	-	13.50	206.600	1	3	8	10	7	-2	27	IV	POOR ROCK	67
13.50	-	15.00	205.100	1	3	8	10	7	-2	27	IV	POOR ROCK	71
15.00	-	16.50	203.600	1	3	8	10	7	-2	27	IV	POOR ROCK	70
18.00	-	19.50	200.600	1	3	8	10	7	-2	27	IV	POOR ROCK	74



BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING/ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 3													
3.00	-	4.50	209.400	1	3	8	10	7	-2	27	IV	POOR ROCK	64
4.50	-	6.00	207.900	1	3	8	10	7	-2	27	IV	POOR ROCK	66
6.00	-	7.50	206.400	1	3	8	10	7	-2	27	IV	POOR ROCK	67
7.50	-	9.00	204.900	1	3	8	10	7	-2	27	IV	POOR ROCK	63
9.00	-	10.50	203.400	1	3	8	10	7	-2	27	IV	POOR ROCK	61
12.00	-	13.50	200.400	1	3	8	10	7	-2	27	IV	POOR ROCK	70
13.50	-	15.00	198.900	1	3	8	10	7	-2	27	IV	POOR ROCK	71
15.00	-	16.50	197.400	1	3	8	10	7	-2	27	IV	POOR ROCK	73
18.00	-	19.50	194.400	1	3	8	10	7	-2	27	IV	POOR ROCK	75
19.50	-	21.00	192.900	1	3	8	10	7	-2	27	IV	POOR ROCK	76
22.50	-	24.00	189.900	1	3	8	10	7	-2	27	IV	POOR ROCK	74
25.50	-	27.00	186.900	1	3	8	10	7	-2	27	IV	POOR ROCK	73
28.50	-	30.00	183.900	1	3	8	10	7	-2	27	IV	POOR ROCK	75

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 4													
4.50	-	6.00	207.500	1	3	8	10	7	-2	27	IV	POOR ROCK	62
6.00	-	7.50	206.000	1	3	8	10	7	-2	27	IV	POOR ROCK	65
7.50	-	9.00	204.500	1	3	8	10	7	-2	27	IV	POOR ROCK	63
9.00	-	10.50	203.000	1	3	8	10	7	-2	27	IV	POOR ROCK	66
12.00	-	13.50	200.000	1	3	8	10	7	-2	27	IV	POOR ROCK	65
13.50	-	15.00	198.500	1	3	8	10	7	-2	27	IV	POOR ROCK	69
15.00	-	16.50	197.000	1	3	8	10	7	-2	27	IV	POOR ROCK	71
18.00	-	19.50	194.000	1	3	8	10	7	-2	27	IV	POOR ROCK	74



BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 5													
3.00	-	4.50	208.100	1	3	8	10	7	-2	27	IV	POOR ROCK	61
4.50	-	6.00	206.600	1	3	8	10	7	-2	27	IV	POOR ROCK	64
6.00	-	7.50	205.100	1	3	8	10	7	-2	27	IV	POOR ROCK	68
7.50	-	9.00	203.600	1	3	8	10	7	-2	27	IV	POOR ROCK	65
9.00	-	10.50	202.100	1	3	8	10	7	-2	27	IV	POOR ROCK	69
12.00	-	13.50	199.100	1	3	8	10	7	-2	27	IV	POOR ROCK	72
13.50	-	15.00	197.600	1	3	8	10	7	-2	27	IV	POOR ROCK	71
15.00	-	16.50	196.100	1	3	8	10	7	-2	27	IV	As POOR ROCK	74
18.00	-	19.50	193.100	1	3	8	10	7	-2	27	IV	POOR ROCK	73
19.50	-	21.00	191.600	1	3	8	10	7	-2	27	IV	POOR ROCK	75
22.50	-	24.00	188.600	1	3	8	10	7	-2	27	IV	POOR ROCK	74
25.50	-	27.00	185.600	1	3	8	10	7	-2	27	IV	POOR ROCK	72
28.50	-	30.00	182.600	1	3	8	10	7	-2	27	IV	POOR ROCK	75

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 6													
4.50	-	6.00	208.100	1	3	8	10	7	-2	27	IV	POOR ROCK	60
6.00	-	7.50	206.600	1	3	8	10	7	-2	27	IV	POOR ROCK	62
7.50	-	9.00	205.100	1	3	8	10	7	-2	27	IV	POOR ROCK	66
9.00	-	10.50	203.600	1	3	8	10	7	-2	27	IV	POOR ROCK	63
12.00	-	13.50	202.100	1	3	8	10	7	-2	27	IV	POOR ROCK	68
13.50	-	15.00	199.100	1	3	8	10	7	-2	27	IV	POOR ROCK	70
15.00	-	16.50	197.600	1	3	8	10	7	-2	27	IV	POOR ROCK	69
18.00	-	19.50	196.100	1	3	8	10	7	-2	27	IV	POOR ROCK	72



BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 7													
3.00	-	4.50	206.800	1	3	8	10	7	-2	27	IV	POOR ROCK	62
4.50	-	6.00	205.300	1	3	8	10	7	-2	27	IV	POOR ROCK	63
6.00	-	7.50	203.800	1	3	8	10	7	-2	27	IV	POOR ROCK	65
7.50	-	9.00	202.300	1	3	8	10	7	-2	27	IV	POOR ROCK	68
9.00	-	10.50	200.800	1	3	8	10	7	-2	27	IV	POOR ROCK	67
12.00	-	13.50	197.800	1	3	8	10	7	-2	27	IV	POOR ROCK	70
13.50	-	15.00	196.300	1	3	8	10	7	-2	27	IV	POOR ROCK	68
15.00	-	16.50	194.800	1	3	8	10	7	-2	27	IV	POOR ROCK	72
18.00	-	19.50	191.800	1	3	8	10	7	-2	27	IV	POOR ROCK	74
19.50	-	21.00	190.300	1	3	8	10	7	-2	27	IV	POOR ROCK	75
22.50	-	24.00	187.300	1	3	8	10	7	-2	27	IV	POOR ROCK	73
25.50	-	27.00	184.300	1	3	8	10	7	-2	27	IV	POOR ROCK	71
28.50	-	30.00	181.300	1	3	8	10	7	-2	27	IV	POOR ROCK	75

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 8													
6.00	-	7.50	211.600	1	3	8	10	7	-2	27	IV	POOR ROCK	61
7.50	-	9.00	210.100	1	3	8	10	7	-2	27	IV	POOR ROCK	60
9.00	-	10.50	208.600	1	3	8	10	7	-2	27	IV	POOR ROCK	62
12.00	-	13.50	205.600	1	3	8	10	7	-2	27	IV	POOR ROCK	64
13.50	-	15.00	204.100	1	3	8	10	7	-2	27	IV	POOR ROCK	66
15.00	-	16.50	202.600	1	3	8	10	7	-2	27	IV	POOR ROCK	68
18.00	-	19.50	199.600	1	3	8	10	7	-2	27	IV	POOR ROCK	69

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCED LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 9													
3.00	-	4.50	210.000	1	3	8	10	7	-2	27	IV	POOR ROCK	61
4.50	-	6.00	208.500	1	3	8	10	7	-2	27	IV	POOR ROCK	64
6.00	-	7.50	207.000	1	3	8	10	7	-2	27	IV	POOR ROCK	63
7.50	-	9.00	205.500	1	3	8	10	7	-2	27	IV	POOR ROCK	65
9.00	-	10.50	204.000	1	3	8	10	7	-2	27	IV	POOR ROCK	68
12.00	-	13.50	201.000	1	3	8	10	7	-2	27	IV	POOR ROCK	70
13.50	-	15.00	199.500	1	3	8	10	7	-2	27	IV	POOR ROCK	71
15.00	-	16.50	198.000	1	3	8	10	7	-2	27	IV	POOR ROCK	69
18.00	-	19.50	195.000	1	3	8	10	7	-2	27	IV	POOR ROCK	72
19.50	-	21.00	193.500	1	3	8	10	7	-2	27	IV	POOR ROCK	70
22.50	-	24.00	190.500	1	3	8	10	7	-2	27	IV	POOR ROCK	73
25.50	-	27.00	187.500	1	3	8	10	7	-2	27	IV	POOR ROCK	71
28.50	-	30.00	184.500	1	3	8	10	7	-2	27	IV	POOR ROCK	74

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 10													
4.50	-	6.00	219.400	1	3	8	10	7	-2	27	IV	POOR ROCK	60
6.00	-	7.50	217.900	1	3	8	10	7	-2	27	IV	POOR ROCK	62
7.50	-	9.00	216.400	1	3	8	10	7	-2	27	IV	POOR ROCK	63
9.00	-	10.50	214.900	1	3	8	10	7	-2	27	IV	POOR ROCK	63
12.00	-	13.50	211.900	1	3	8	10	7	-2	27	IV	POOR ROCK	65
13.50	-	15.00	210.400	1	3	8	10	7	-2	27	IV	POOR ROCK	64
15.00	-	16.50	208.900	1	3	8	10	7	-2	27	IV	POOR ROCK	66
18.00	-	19.50	205.900	1	3	8	10	7	-2	27	IV	POOR ROCK	68



BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 11													
3.00	-	4.50	216.900	1	3	8	10	7	-2	27	IV	POOR ROCK	60
4.50	-	6.00	215.400	1	3	8	10	7	-2	27	IV	POOR ROCK	61
6.00	-	7.50	213.900	1	3	8	10	7	-2	27	IV	POOR ROCK	61
7.50	-	9.00	212.400	1	3	8	10	7	-2	27	IV	POOR ROCK	63
9.00	-	10.50	210.900	1	3	8	10	7	-2	27	IV	POOR ROCK	64
12.00	-	13.50	207.900	1	3	8	10	7	-2	27	IV	POOR ROCK	65
13.50	-	15.00	206.400	1	3	8	10	7	-2	27	IV	POOR ROCK	68
15.00	-	16.50	204.900	1	3	8	10	7	-2	27	IV	POOR ROCK	67
18.00	-	19.50	201.900	1	3	8	10	7	-2	27	IV	POOR ROCK	69
19.50	-	21.00	200.400	1	3	8	10	7	-2	27	IV	POOR ROCK	71
22.50	-	24.00	197.400	1	3	8	10	7	-2	27	IV	POOR ROCK	72
25.50	-	27.00	194.400	1	3	8	10	7	-2	27	IV	POOR ROCK	74
28.50	-	30.00	191.400	1	3	8	10	7	-2	27	IV	POOR ROCK	73

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 12													
3.00	-	4.50	208.800	1	3	8	10	7	-2	27	IV	POOR ROCK	62
4.50	-	6.00	207.300	1	3	8	10	7	-2	27	IV	POOR ROCK	64
6.00	-	7.50	205.800	1	3	8	10	7	-2	27	IV	POOR ROCK	61
7.50	-	9.00	204.300	1	3	8	10	7	-2	27	IV	POOR ROCK	63
9.00	-	10.50	202.800	1	3	8	10	7	-2	27	IV	POOR ROCK	62
12.00	-	13.50	199.800	1	3	8	10	7	-2	27	IV	POOR ROCK	64
13.50	-	15.00	198.300	1	3	8	10	7	-2	27	IV	POOR ROCK	65
15.00	-	16.50	196.800	1	3	8	10	7	-2	27	IV	POOR ROCK	66
18.00	-	19.50	193.800	1	3	8	10	7	-2	27	IV	POOR ROCK	68

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCED LEVEL	UCS RATING/ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 13													
3.00	-	4.50	212.000	1	3	8	10	7	-2	27	IV	POOR ROCK	61
4.50	-	6.00	210.500	1	3	8	10	7	-2	27	IV	POOR ROCK	60
6.00	-	7.50	209.000	1	3	8	10	7	-2	27	IV	POOR ROCK	63
7.50	-	9.00	207.500	1	3	8	10	7	-2	27	IV	POOR ROCK	64
9.00	-	10.50	206.000	1	3	8	10	7	-2	27	IV	POOR ROCK	64
12.00	-	13.50	203.000	1	3	8	10	7	-2	27	IV	POOR ROCK	68
13.50	-	15.00	201.500	1	3	8	10	7	-2	27	IV	POOR ROCK	67
15.00	-	16.50	200.000	1	3	8	10	7	-2	27	IV	POOR ROCK	65
18.00	-	19.50	197.000	1	3	8	10	7	-2	27	IV	POOR ROCK	69
19.50	-	21.00	195.500	1	3	8	10	7	-2	27	IV	POOR ROCK	71
22.50	-	24.00	192.500	1	3	8	10	7	-2	27	IV	POOR ROCK	73
25.50	-	27.00	189.500	1	3	8	10	7	-2	27	IV	POOR ROCK	75
28.50	-	30.00	186.500	1	3	8	10	7	-2	27	IV	POOR ROCK	73

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 14													
1.50	-	3.00	220.400	1	3	8	10	7	-2	27	IV	POOR ROCK	60
3.00	-	4.50	218.900	1	3	8	10	7	-2	27	IV	POOR ROCK	61
4.50	-	6.00	217.400	1	3	8	10	7	-2	27	IV	POOR ROCK	63
6.00	-	7.50	215.900	1	3	8	10	7	-2	27	IV	POOR ROCK	65
7.50	-	9.00	214.400	1	3	8	10	7	-2	27	IV	POOR ROCK	66
9.00	-	10.50	212.900	1	3	8	10	7	-2	27	IV	POOR ROCK	63
12.00	-	13.50	209.900	1	3	8	10	7	-2	27	IV	POOR ROCK	61
13.50	-	15.00	208.400	1	3	8	10	7	-2	27	IV	POOR ROCK	60
15.00	-	16.50	206.900	1	3	8	10	7	-2	27	IV	POOR ROCK	63
18.00	-	19.50	203.900	1	3	8	10	7	-2	27	IV	POOR ROCK	68

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING/ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 15													
3.00	-	4.50	213.100	1	3	8	10	7	-2	27	IV	POOR ROCK	60
4.50	-	6.00	211.600	1	3	8	10	7	-2	27	IV	POOR ROCK	61
6.00	-	7.50	210.100	1	3	8	10	7	-2	27	IV	POOR ROCK	63
7.50	-	9.00	208.600	1	3	8	10	7	-2	27	IV	POOR ROCK	62
9.00	-	10.50	207.100	1	3	8	10	7	-2	27	IV	POOR ROCK	62
12.00	-	13.50	204.100	1	3	8	10	7	-2	27	IV	POOR ROCK	65
13.50	-	15.00	202.600	1	3	8	10	7	-2	27	IV	POOR ROCK	63
15.00	-	16.50	201.100	1	3	8	10	7	-2	27	IV	POOR ROCK	67
18.00	-	19.50	198.100	1	3	8	10	7	-2	27	IV	POOR ROCK	69
19.50	-	21.00	196.600	1	3	8	10	7	-2	27	IV	POOR ROCK	70
22.50	-	24.00	193.600	1	3	8	10	7	-2	27	IV	POOR ROCK	68
25.50	-	27.00	190.600	1	3	8	10	7	-2	27	IV	POOR ROCK	71
28.50	-	30.00	187.600	1	3	8	10	7	-2	27	IV	POOR ROCK	73

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 16													
3.00	-	4.50	213.100	1	3	8	10	7	-2	27	IV	POOR ROCK	62
4.50	-	6.00	211.600	1	3	8	10	7	-2	27	IV	POOR ROCK	61
6.00	-	7.50	210.100	1	3	8	10	7	-2	27	IV	POOR ROCK	60
7.50	-	9.00	208.600	1	3	8	10	7	-2	27	IV	POOR ROCK	62
9.00	-	10.50	207.100	1	3	8	10	7	-2	27	IV	POOR ROCK	64
12.00	-	13.50	204.100	1	3	8	10	7	-2	27	IV	POOR ROCK	65
13.50	-	15.00	202.600	1	3	8	10	7	-2	27	IV	POOR ROCK	66
15.00	-	16.50	201.100	1	3	8	10	7	-2	27	IV	POOR ROCK	68
18.00	-	19.50	198.100	1	3	8	10	7	-2	27	IV	POOR ROCK	69

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 17													
3.00	-	4.50	214.700	1	3	8	10	7	-2	27	IV	POOR ROCK	61
4.50	-	6.00	213.200	1	3	8	10	7	-2	27	IV	POOR ROCK	62
6.00	-	7.50	211.700	1	3	8	10	7	-2	27	IV	POOR ROCK	63
7.50	-	9.00	210.200	1	3	8	10	7	-2	27	IV	POOR ROCK	62
9.00	-	10.50	208.700	1	3	8	10	7	-2	27	IV	POOR ROCK	65
12.00	-	13.50	205.700	1	3	8	10	7	-2	27	IV	POOR ROCK	64
13.50	-	15.00	204.200	1	3	8	10	7	-2	27	IV	POOR ROCK	65
15.00	-	16.50	202.700	1	3	8	10	7	-2	27	IV	POOR ROCK	67
18.00	-	19.50	199.700	1	3	8	10	7	-2	27	IV	POOR ROCK	69
19.50	-	21.00	198.200	1	3	8	10	7	-2	27	IV	POOR ROCK	68
22.50	-	24.00	195.200	1	3	8	10	7	-2	27	IV	POOR ROCK	70
25.50	-	27.00	192.200	1	3	8	10	7	-2	27	IV	POOR ROCK	65
28.50	-	30.00	189.200	1	3	8	10	7	-2	27	IV	POOR ROCK	68

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING/ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 18													
3.00	-	4.50	211.200	1	3	8	10	7	-2	27	IV	POOR ROCK	61
4.50	-	6.00	209.700	1	3	8	10	7	-2	27	IV	POOR ROCK	63
6.00	-	7.50	208.200	1	3	8	10	7	-2	27	IV	POOR ROCK	65
7.50	-	9.00	206.700	1	3	8	10	7	-2	27	IV	POOR ROCK	66
9.00	-	10.50	205.200	1	3	8	10	7	-2	27	IV	POOR ROCK	64
12.00	-	13.50	202.200	1	3	8	10	7	-2	27	IV	POOR ROCK	66
13.50	-	15.00	200.700	1	3	8	10	7	-2	27	IV	POOR ROCK	68
15.00	-	16.50	199.200	1	3	8	10	7	-2	27	IV	POOR ROCK	69
18.00	-	19.50	196.200	1	3	8	10	7	-2	27	IV	POOR ROCK	69

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION								As Per IS 12070-1987			
DEPTH OF BORE HOLE	REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre	metre										
Bore Hole No. - 19											
4.50	- 6.00	205.000	1	3	8	10	7	-2	27	IV	POOR ROCK 63
6.00	- 7.50	203.500	1	3	8	10	7	-2	27	IV	POOR ROCK 65
7.50	- 9.00	202.000	1	3	8	10	7	-2	27	IV	POOR ROCK 63
9.00	- 10.50	200.500	1	3	8	10	7	-2	27	IV	POOR ROCK 66
12.00	- 13.50	197.500	1	3	8	10	7	-2	27	IV	POOR ROCK 63
13.50	- 15.00	196.000	1	3	8	10	7	-2	27	IV	POOR ROCK 68
15.00	- 16.50	194.500	1	3	8	10	7	-2	27	IV	POOR ROCK 69
18.00	- 19.50	191.500	1	3	8	10	7	-2	27	IV	POOR ROCK 71
19.50	- 21.00	190.000	1	3	8	10	7	-2	27	IV	POOR ROCK 72
22.50	- 24.00	187.000	1	3	8	10	7	-2	27	IV	POOR ROCK 70
25.50	- 27.00	184.000	1	3	8	10	7	-2	27	IV	POOR ROCK 69
28.50	- 30.00	181.000	1	3	8	10	7	-2	27	IV	POOR ROCK 70

BEARING CAPACITY ON THE BASIS OF RMR CALCULATION										As Per IS 12070-1987			
DEPTH OF BORE HOLE			REDUCE D LEVEL	UCS RATING\ POINT LOAD	RQD RATING	SPACING OF JOINT RATING	CONDITION OF JOINT RATING	GROUND WATER RATING	STRIKE & DIP ORIENTATION OF JOINTS	RMR	CLASS No.	DESCRIPTION	Net safe Bearing Pressure qns tonn/m2
metre			metre										
Bore Hole No. - 20													
3.00	-	4.50	208.200	1	3	8	10	7	-2	27	IV	POOR ROCK	61
4.50	-	6.00	206.700	1	3	8	10	7	-2	27	IV	POOR ROCK	60
6.00	-	7.50	205.200	1	3	8	10	7	-2	27	IV	POOR ROCK	65
7.50	-	9.00	203.700	1	3	8	10	7	-2	27	IV	POOR ROCK	63
9.00	-	10.50	202.200	1	3	8	10	7	-2	27	IV	POOR ROCK	64
12.00	-	13.50	199.200	1	3	8	10	7	-2	27	IV	POOR ROCK	65
13.50	-	15.00	197.700	1	3	8	10	7	-2	27	IV	POOR ROCK	68
15.00	-	16.50	196.200	1	3	8	10	7	-2	27	IV	POOR ROCK	67
18.00	-	19.50	193.200	1	3	8	10	7	-2	27	IV	POOR ROCK	69

CHEMICAL ANALYSIS

▪ SOIL SAMPLE

The results are given below:-

S.No	Locations	Chemical Tests		
		Ph value	Chloride (%)	Sulphate (%)
1.	BH-1	7.45	0.34	0.04
2.	BH-2	6.69	0.31	0.06
3.	BH-3	7.12	0.36	0.07
4.	BH-4	6.65	0.33	0.05
5.	BH-5	6.88	0.29	0.04
6.	BH-6	7.40	0.30	0.08
7.	BH-7	7.36	0.35	0.09
8.	BH-8	6.79	0.32	0.06
9.	BH-9	6.26	0.37	0.05
10.	BH-10	7.11	0.26	0.03
11.	BH-11	7.81	0.38	0.08
12.	BH-12	7.40	0.27	0.04
13.	BH-13	6.63	0.37	0.06
14.	BH-14	7.20	0.32	0.05
15.	BH-15	7.48	0.29	0.07
16.	BH-16	6.89	0.30	0.09
17.	BH-17	7.82	0.25	0.06
18.	BH-18	7.34	0.28	0.03
19.	BH-19	6.89	0.30	0.08
20.	BH-20	7.15	0.33	0.07

Note: As per IS 456 Permissible limit of Sulphate is 0.5 %.

▪ **WATER SAMPLE**

The results are given below:-

S.No	Locations	Chemical Tests		
		Ph value	Chloride (mg/l)	Sulphate (mg/l)
1.	BH-1	7.88	274	127
2.	BH-2	7.15	288	120
3.	BH-3	7.20	271	121
4.	BH-4	6.87	287	119
5.	BH-5	7.13	284	129
6.	BH-6	8.15	280	118
7.	BH-7	7.48	289	131
8.	BH-8	7.30	276	128
9.	BH-9	6.58	271	124
10.	BH-10	6.84	277	121
11.	BH-11	7.44	269	126
12.	BH-12	6.57	273	130
13.	BH-13	7.82	281	119
14.	BH-14	7.36	280	125
15.	BH-15	7.12	269	118
16.	BH-16	8.14	288	128
17.	BH-17	7.30	274	120
18.	BH-18	6.69	279	129
19.	BH-19	7.41	270	121
20.	BH-20	7.65	281	126

Note:

1. As per IS 456 Permissible limit of Sulphate is 400 Max.

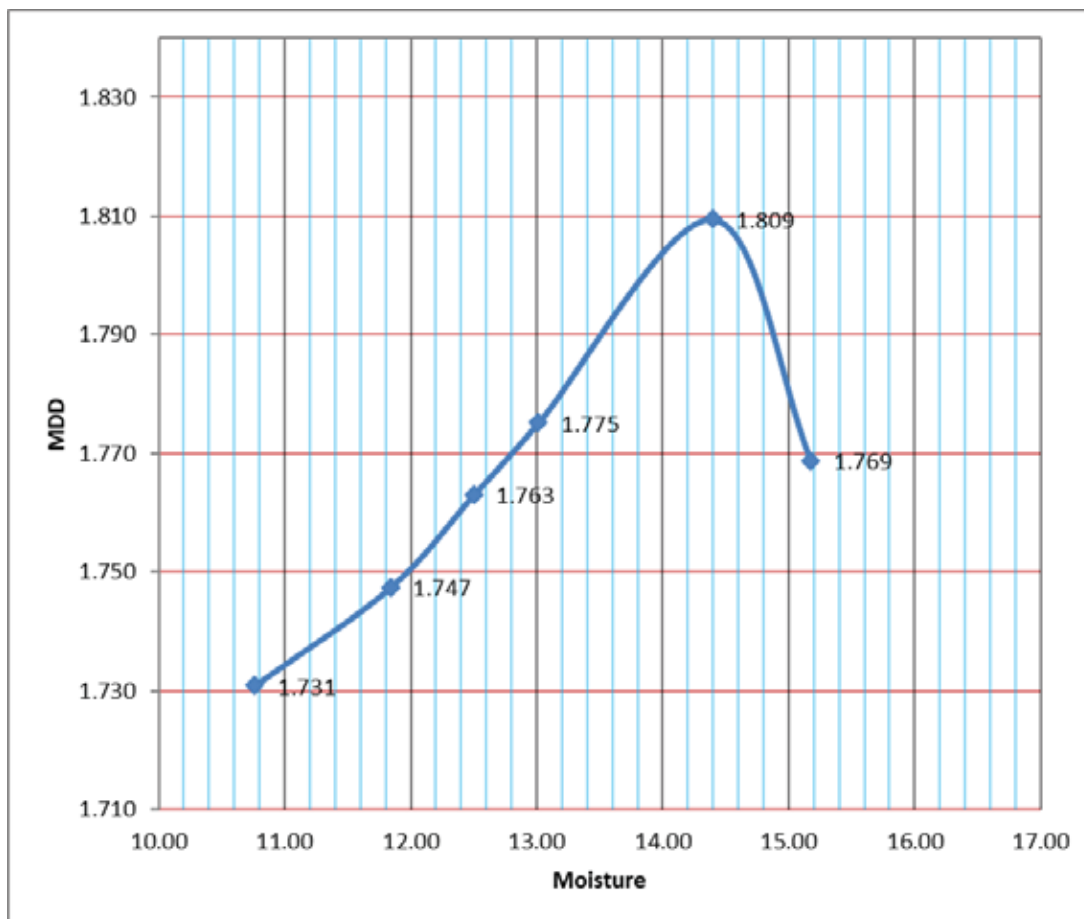
2. As per IS 456 Permissible limit of Chloride is 500/2000 Max for RCC/C.C

Modified Proctor Density Test

MOISTURE - DENSITY RELATIONSHIP OF SOIL

S.no	Location	MDD (gm/cc)	OMC (%)
1.	BH-1	1.81	14.40

GRAPH



S.no	Location	OMC (%)	MDD (gm/cc)
2.	BH-2	14.19	1.83
3.	BH-3	13.48	1.76
4.	BH-4	12.85	1.75
5.	BH-5	15.14	1.84
6.	BH-6	13.21	1.75
7.	BH-7	12.35	1.74
8.	BH-8	13.29	1.76
9.	BH-9	12.88	1.76
10.	BH-10	13.47	1.75
11.	BH-11	12.91	1.74
12.	BH-12	14.69	1.81
13.	BH-13	13.59	1.77
14.	BH-14	12.79	1.75
15.	BH-15	15.57	1.82
16.	BH-16	14.58	1.82
17.	BH-17	12.87	1.76
18.	BH-18	13.67	1.76
19.	BH-19	14.11	1.77
20.	BH-20	14.97	1.80

CALIFORNIA BEARING RATIO RESULTS					
S No.	Location	CBR Unsoaked (%)	S No.	Location	CBR Unsoaked (%)
1.	BH-1	9.7	11.	BH-11	9.4
2.	BH-2	9.3	12.	BH-12	8.2
3.	BH-3	10.1	13.	BH-13	8.9
4.	BH-4	8.4	14.	BH-14	9.6
5.	BH-5	7.8	15.	BH-15	7.1
6.	BH-6	7.6	16.	BH-16	9.3
7.	BH-7	8.1	17.	BH-17	10.1
8.	BH-8	7.5	18.	BH-18	8.6
9.	BH-9	7.1	19.	BH-19	9.4
10.	BH-10	8.3	20.	BH-20	8.5

**Standard Proctor test has been performed*
**CBR has been performed on the actual MDD achieved while test.*

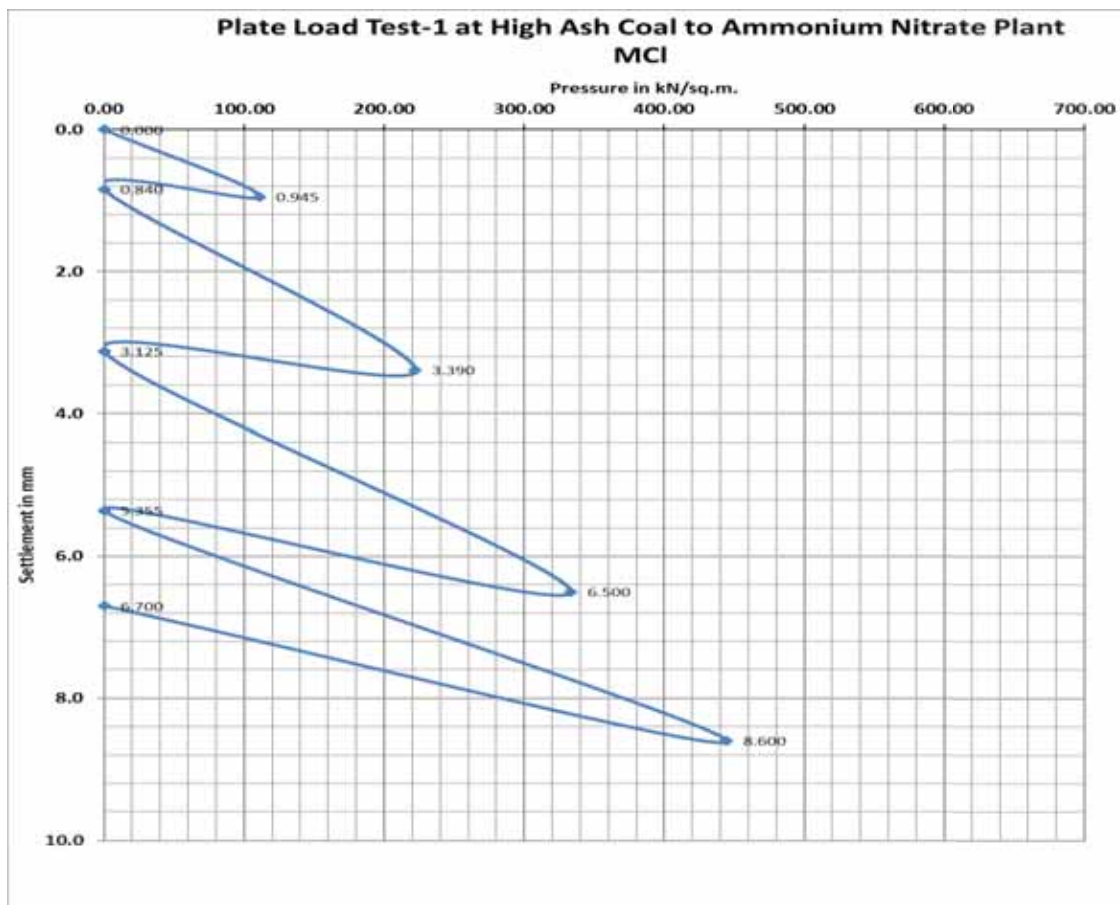
CYCLIC PLATE LOAD TEST

THE COEFFICIENT OF ELASTIC UNIFORM SHEAR AND ELASTIC NON- UNIFORM SHEAR			
Location	Coefficient of elastic uniform Compression (C_u)	Coefficient of elastic uniform shear (C_t)	Coefficient of elastic Non- uniform Compression (C_q)
BH-1	$3.01 \times 10^4 \text{ Kn/m}^3$	$1.50 \times 10^4 \text{ Kn/m}^3$	$5.20 \times 10^4 \text{ Kn/m}^3$
BH-2	$2.20 \times 10^4 \text{ Kn/m}^3$	$1.10 \times 10^4 \text{ Kn/m}^3$	$3.80 \times 10^4 \text{ Kn/m}^3$
BH-3	$2.41 \times 10^4 \text{ Kn/m}^3$	$1.20 \times 10^4 \text{ Kn/m}^3$	$4.16 \times 10^4 \text{ Kn/m}^3$
BH-4	$2.04 \times 10^4 \text{ Kn/m}^3$	$1.02 \times 10^4 \text{ Kn/m}^3$	$3.52 \times 10^4 \text{ Kn/m}^3$
BH-5	$2.08 \times 10^4 \text{ Kn/m}^3$	$1.04 \times 10^4 \text{ Kn/m}^3$	$3.59 \times 10^4 \text{ Kn/m}^3$
BH-6	$1.68 \times 10^4 \text{ Kn/m}^3$	$8.40 \times 10^3 \text{ Kn/m}^3$	$2.90 \times 10^4 \text{ Kn/m}^3$
BH-7	$2.26 \times 10^4 \text{ Kn/m}^3$	$1.13 \times 10^4 \text{ Kn/m}^3$	$3.90 \times 10^4 \text{ Kn/m}^3$
BH-8	$2.95 \times 10^4 \text{ Kn/m}^3$	$1.47 \times 10^4 \text{ Kn/m}^3$	$5.10 \times 10^4 \text{ Kn/m}^3$
BH-9	$2.97 \times 10^4 \text{ Kn/m}^3$	$1.48 \times 10^4 \text{ Kn/m}^3$	$5.13 \times 10^4 \text{ Kn/m}^3$
BH-10	$1.53 \times 10^4 \text{ Kn/m}^3$	$7.65 \times 10^3 \text{ Kn/m}^3$	$2.64 \times 10^4 \text{ Kn/m}^3$
BH-11	$2.50 \times 10^4 \text{ Kn/m}^3$	$1.25 \times 10^4 \text{ Kn/m}^3$	$4.37 \times 10^4 \text{ Kn/m}^3$
BH-12	$2.85 \times 10^4 \text{ Kn/m}^3$	$1.42 \times 10^4 \text{ Kn/m}^3$	$4.93 \times 10^4 \text{ Kn/m}^3$
BH-13	$2.62 \times 10^4 \text{ Kn/m}^3$	$1.31 \times 10^4 \text{ Kn/m}^3$	$4.53 \times 10^4 \text{ Kn/m}^3$
BH-14	$2.79 \times 10^4 \text{ Kn/m}^3$	$1.39 \times 10^4 \text{ Kn/m}^3$	$4.82 \times 10^4 \text{ Kn/m}^3$
BH-15	$2.44 \times 10^4 \text{ Kn/m}^3$	$1.22 \times 10^4 \text{ Kn/m}^3$	$4.22 \times 10^4 \text{ Kn/m}^3$
BH-16	$2.59 \times 10^4 \text{ Kn/m}^3$	$1.29 \times 10^4 \text{ Kn/m}^3$	$4.48 \times 10^4 \text{ Kn/m}^3$
BH-17	$2.17 \times 10^4 \text{ Kn/m}^3$	$1.08 \times 10^4 \text{ Kn/m}^3$	$3.75 \times 10^4 \text{ Kn/m}^3$
BH-18	$2.52 \times 10^4 \text{ Kn/m}^3$	$1.26 \times 10^4 \text{ Kn/m}^3$	$4.35 \times 10^4 \text{ Kn/m}^3$
BH-19	$1.60 \times 10^4 \text{ Kn/m}^3$	$8.02 \times 10^3 \text{ Kn/m}^3$	$2.76 \times 10^4 \text{ Kn/m}^3$
BH-20	$2.13 \times 10^3 \text{ Kn/m}^3$	$1.06 \times 10^4 \text{ Kn/m}^3$	$3.68 \times 10^4 \text{ Kn/m}^3$

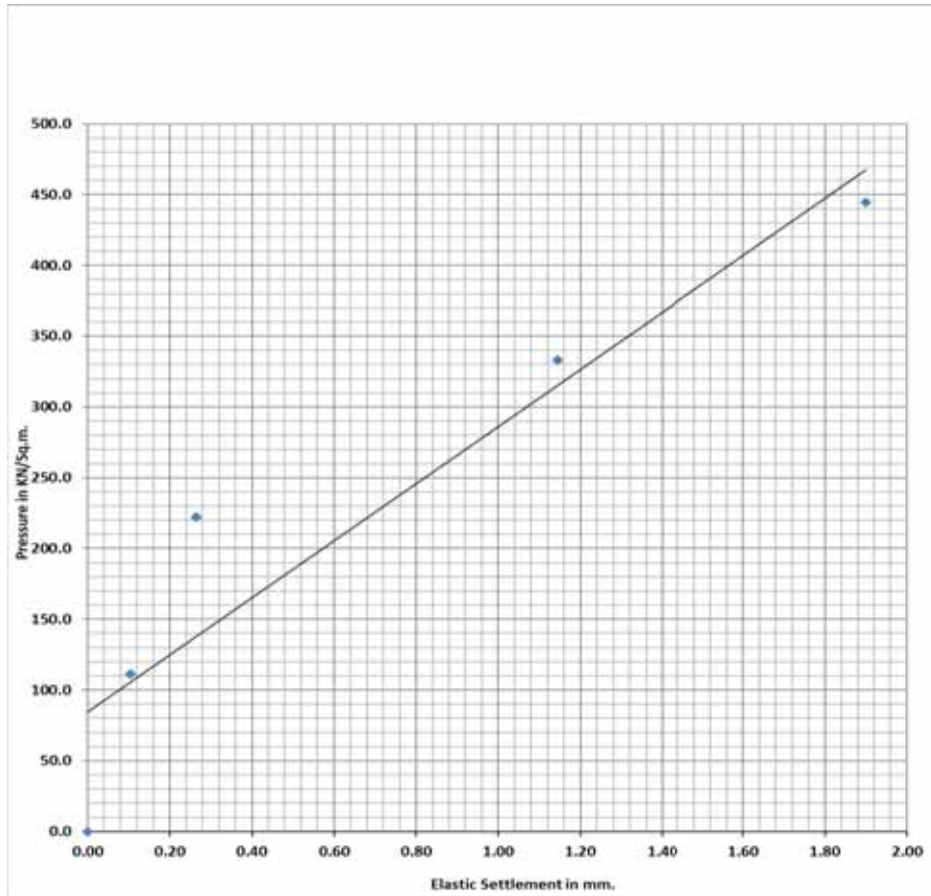
TEST NO 1

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.945
0.00	0.840
222.2	3.390
0.00	3.125
333.3	6.500
0.00	5.355
444.4	8.600
0.00	6.700



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.105
222.2	0.265
333.3	1.145
444.4	1.900



Thus, for 4 m² base area

$$C_u = 20.1 \times 10^4 \times \sqrt{0.09/4} = 3.01 \times 10^4 \text{ Kn/m}^3$$

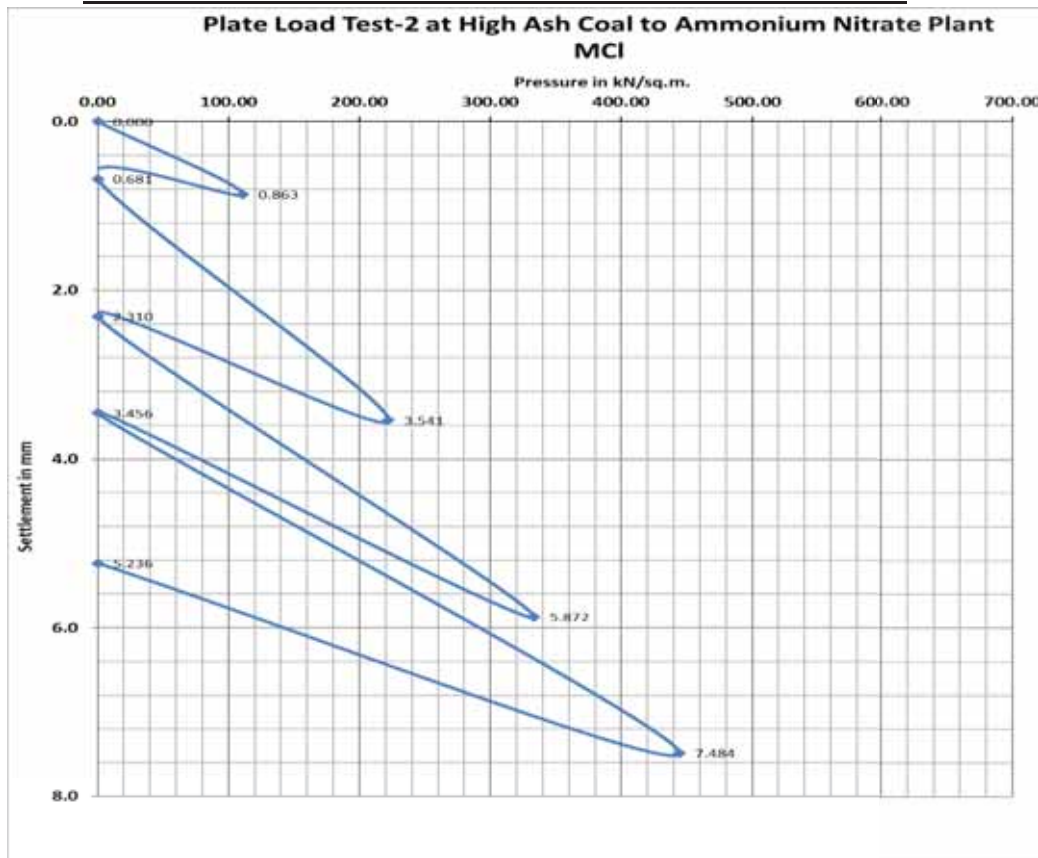
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 3.01 \times 10^4 \text{ Kn/m}^3 \\ &= 1.50 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 3.01 \times 10^4 \text{ Kn/m}^3 \\ &= 5.20 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

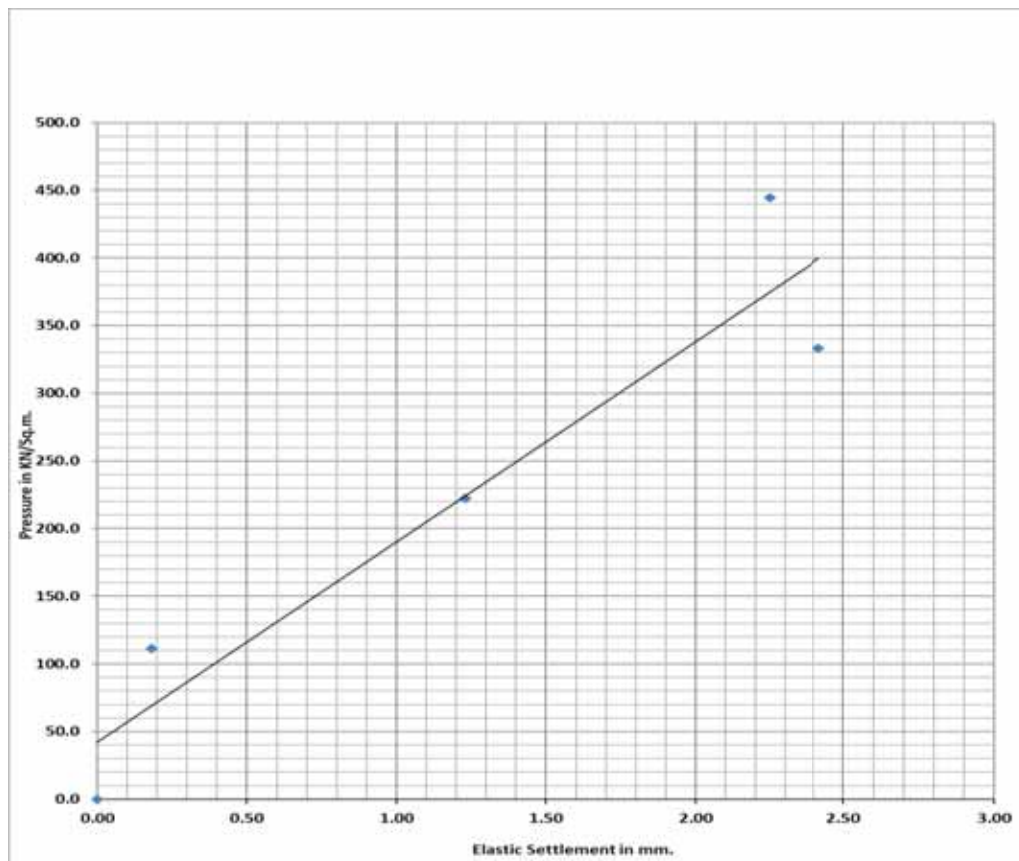
TEST NO 2

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.863
0.00	0.681
222.2	3.541
0.00	2.310
333.3	5.872
0.00	3.456
444.4	7.484
0.00	5.236

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.182
222.2	1.231
333.3	2.416
444.4	2.248



Thus, for 4 m² base area

$$C_u = 14.7 \times 10^4 \times \sqrt{0.09/4} = 2.20 \times 10^4 \text{ Kn/m}^3$$

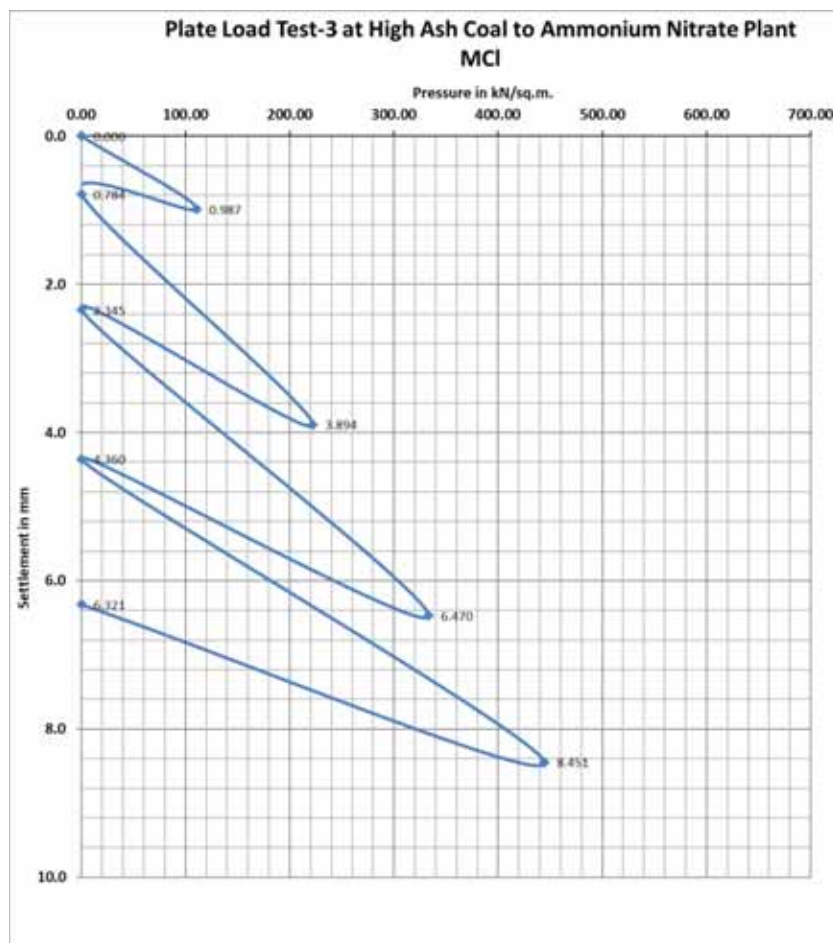
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.20 \times 10^4 \text{ Kn/m}^3 \\ &= 1.10 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.20 \times 10^4 \text{ Kn/m}^3 \\ &= 3.80 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

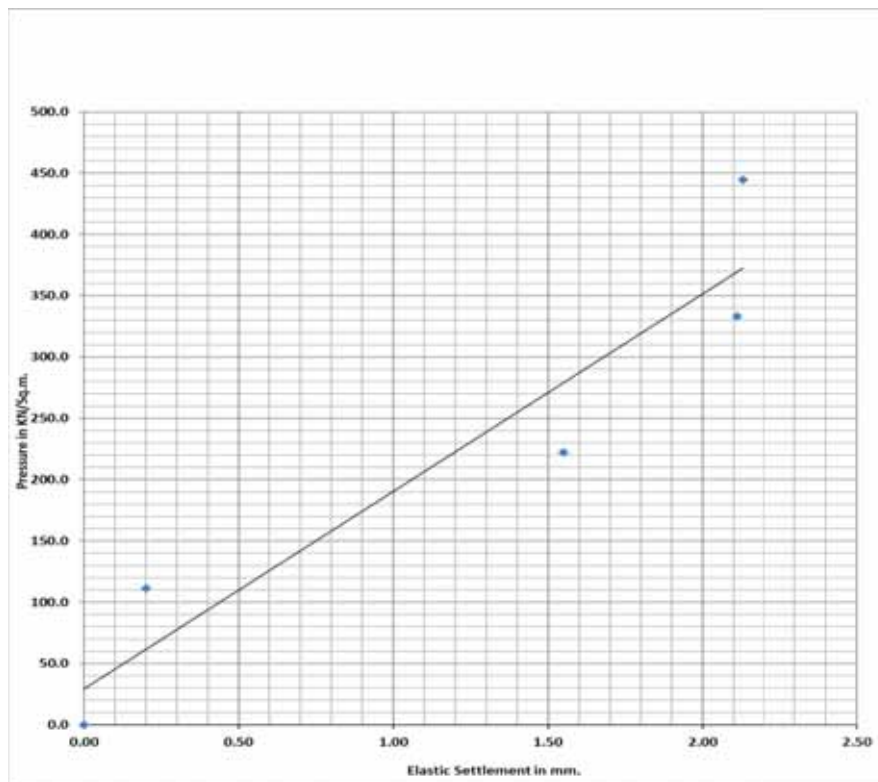
TEST NO 3

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.987
0.00	0.784
222.2	3.894
0.00	2.345
333.3	6.470
0.00	4.360
444.4	8.451
0.00	6.321



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.203
222.2	1.549
333.3	2.110
444.4	2.130



Thus, for 4 m² base area

$$C_u = 16.1 \times 10^4 \times \sqrt{0.09/4} = 2.41 \times 10^4 \text{ Kn/m}^3$$

$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.41 \times 10^4 \text{ Kn/m}^3 \\ &= 1.20 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.41 \times 10^4 \text{ Kn/m}^3 \\ &= 4.16 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

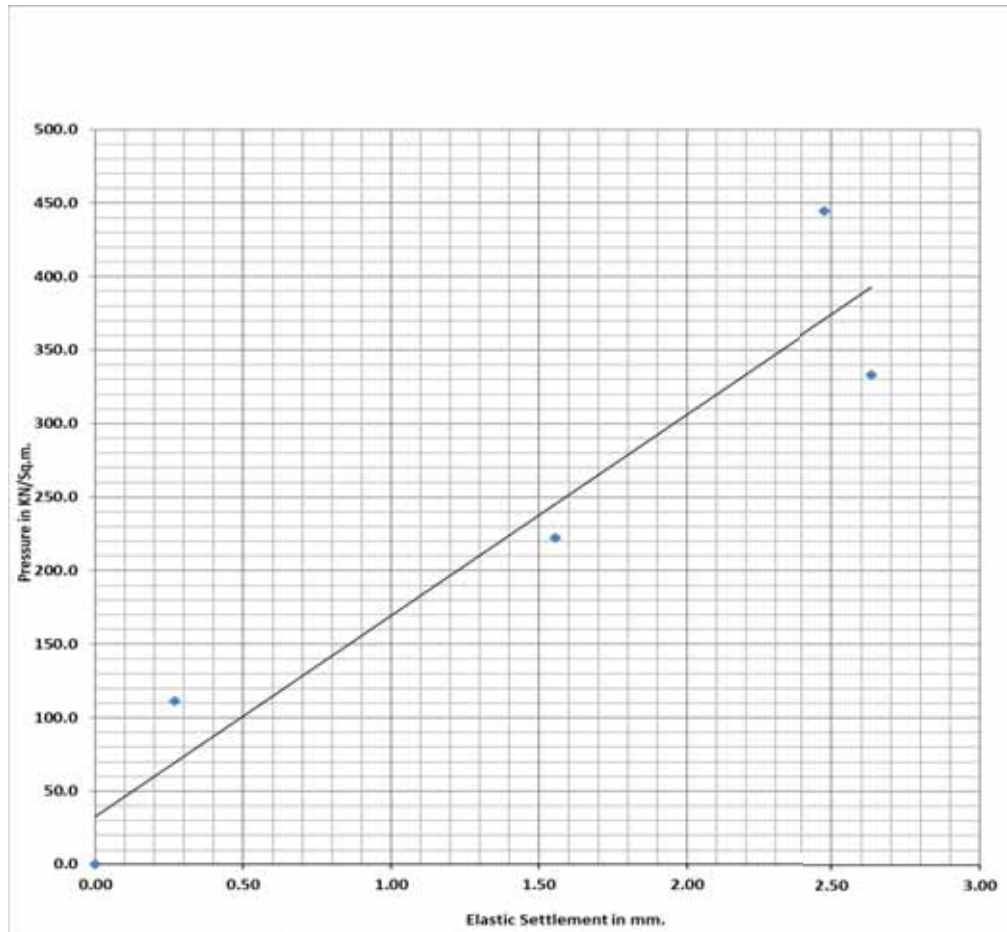
TEST NO 4

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.089
0.00	0.821
222.2	4.253
0.00	2.698
333.3	6.891
0.00	4.256
444.4	9.365
0.00	6.889



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.268
222.2	1.555
333.3	2.635
444.4	2.476



Thus, for 4 m² base area

$$C_u = 13.6 \times 10^4 \times \sqrt{0.09/4} = 2.04 \times 10^4 \text{ Kn/m}^3$$

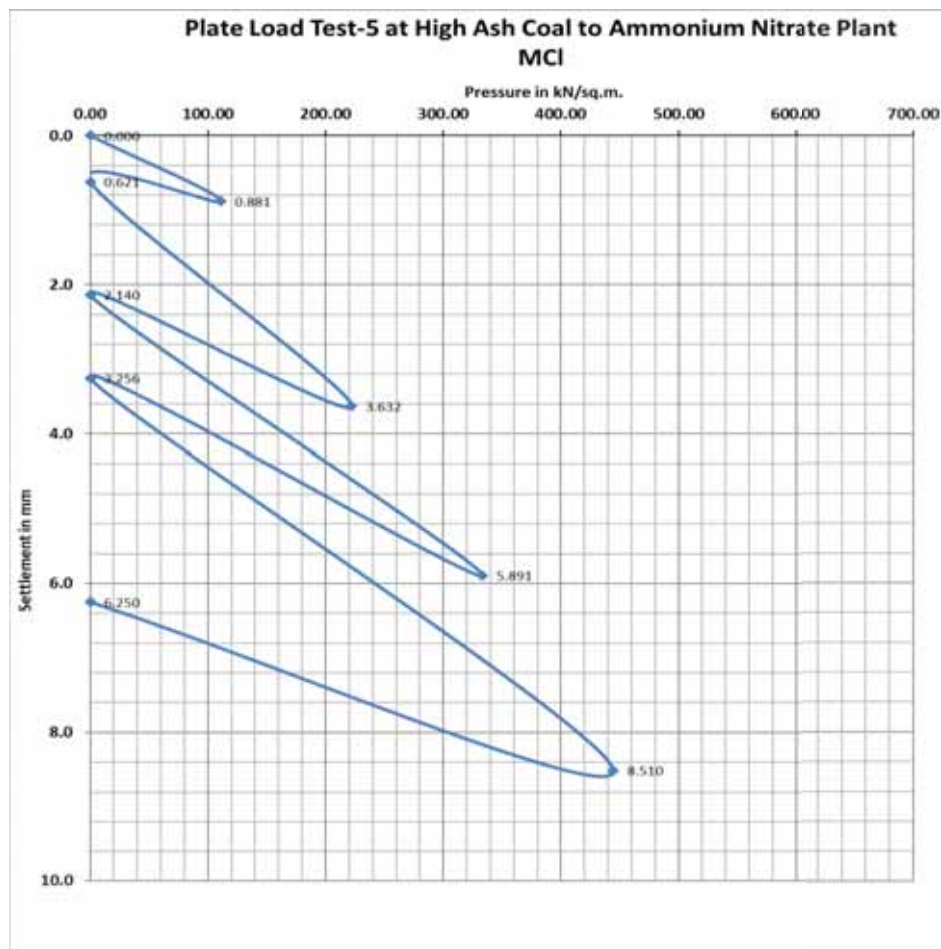
$$C_t = 0.5 \times C_u = 0.5 \times 2.04 \times 10^4 \text{ Kn/m}^3 \\ = 1.02 \times 10^4 \text{ Kn/m}^3$$

$$C_q = 1.73 \times C_u = 1.73 \times 2.04 \times 10^4 \text{ Kn/m}^3 \\ = 3.52 \times 10^4 \text{ Kn/m}^3$$

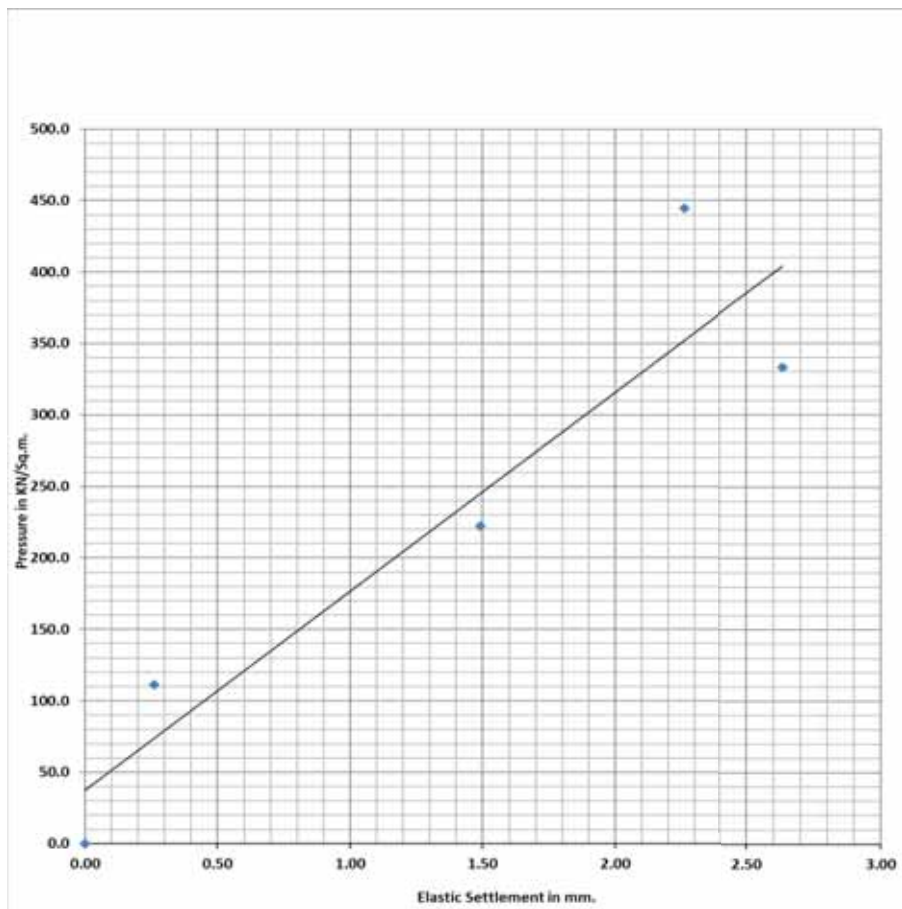
TEST NO 5

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.881
0.00	0.621
222.2	3.632
0.00	2.140
333.3	5.891
0.00	3.256
444.4	8.510
0.00	6.250



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.260
222.2	1.492
333.3	2.635
444.4	2.260



Thus, for 4 m² base area

$$C_u = 13.9 \times 10^4 \times \sqrt{0.09/4} = 2.08 \times 10^4 \text{ Kn/m}^3$$

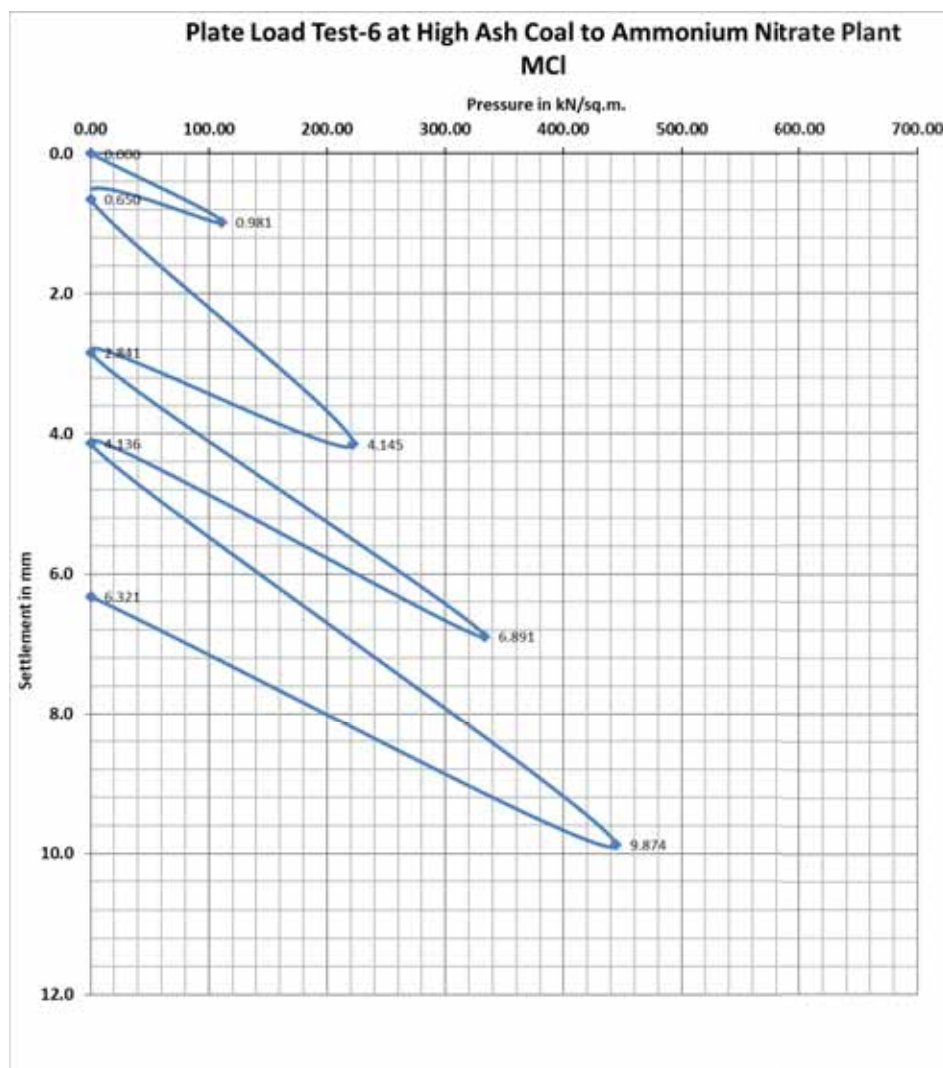
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.08 \times 10^4 \text{ Kn/m}^3 \\ &= 1.04 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.08 \times 10^4 \text{ Kn/m}^3 \\ &= 3.59 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

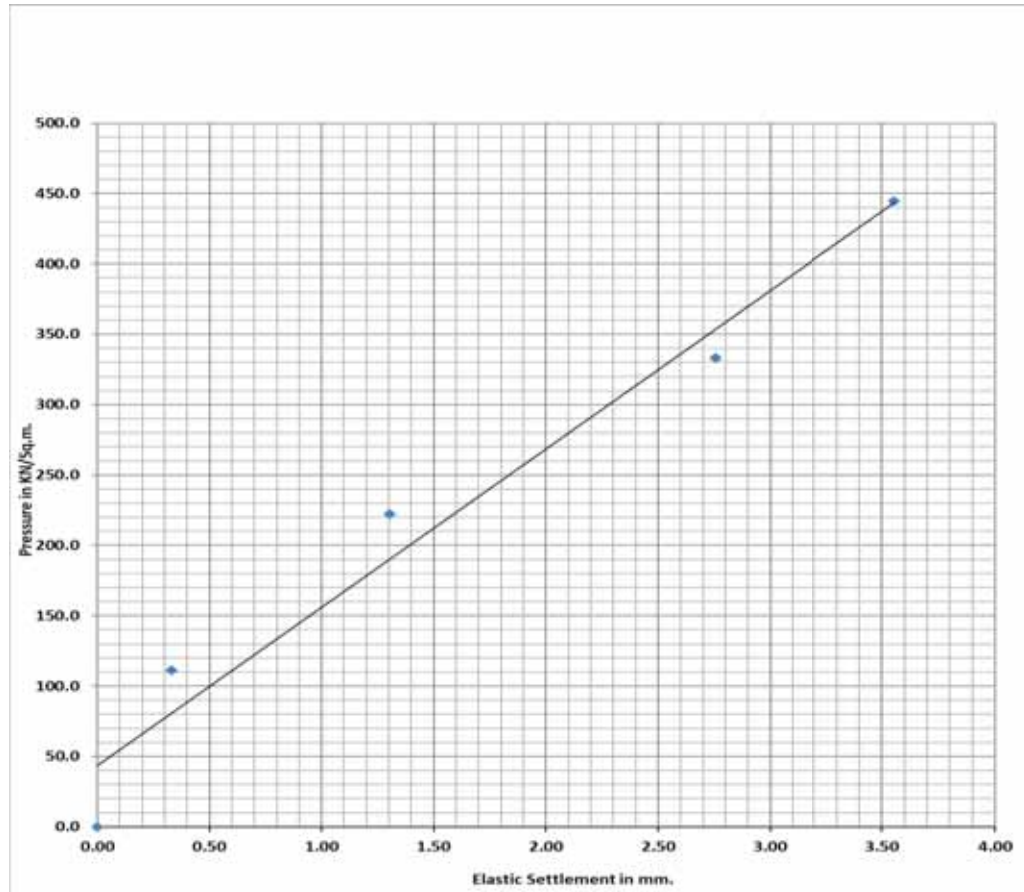
TEST NO 6

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.981
0.00	0.650
222.2	4.145
0.00	2.841
333.3	6.891
0.00	4.136
444.4	9.874
0.00	6.321



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.331
222.2	1.304
333.3	2.755
444.4	3.553



Thus, for 4 m² base area

$$C_u = 11.2 \times 10^4 \times \sqrt{0.09/4} = 1.68 \times 10^4 \text{ Kn/m}^3$$

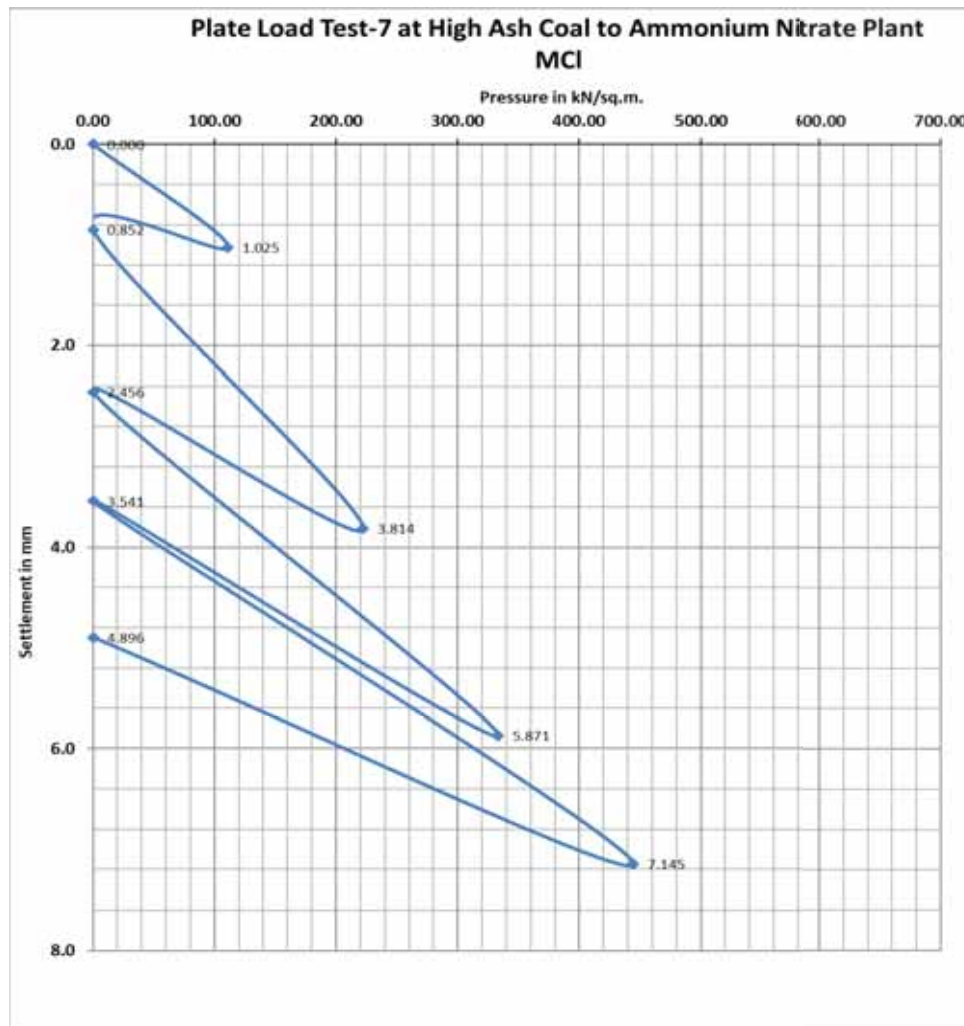
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 1.68 \times 10^4 \text{ Kn/m}^3 \\ &= 8.40 \times 10^3 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 1.68 \times 10^4 \text{ Kn/m}^3 \\ &= 2.90 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

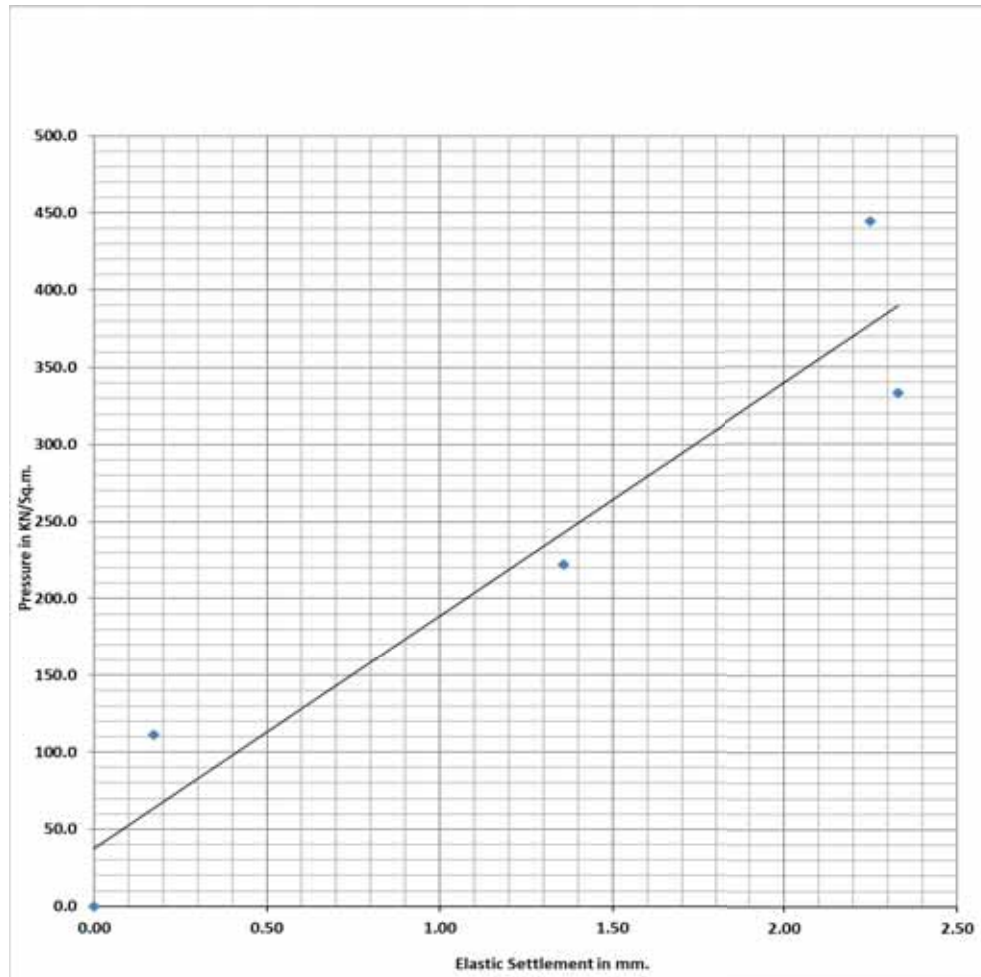
TEST NO 7

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.025
0.00	0.852
222.2	3.814
0.00	2.456
333.3	5.871
0.00	3.541
444.4	7.145
0.00	4.896



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.173
222.2	1.358
333.3	2.330
444.4	2.249



Thus, for 4 m² base area

$$C_u = 15.1 \times 10^4 \times \sqrt{0.09/4} = 2.26 \times 10^4 \text{ Kn/m}^3$$

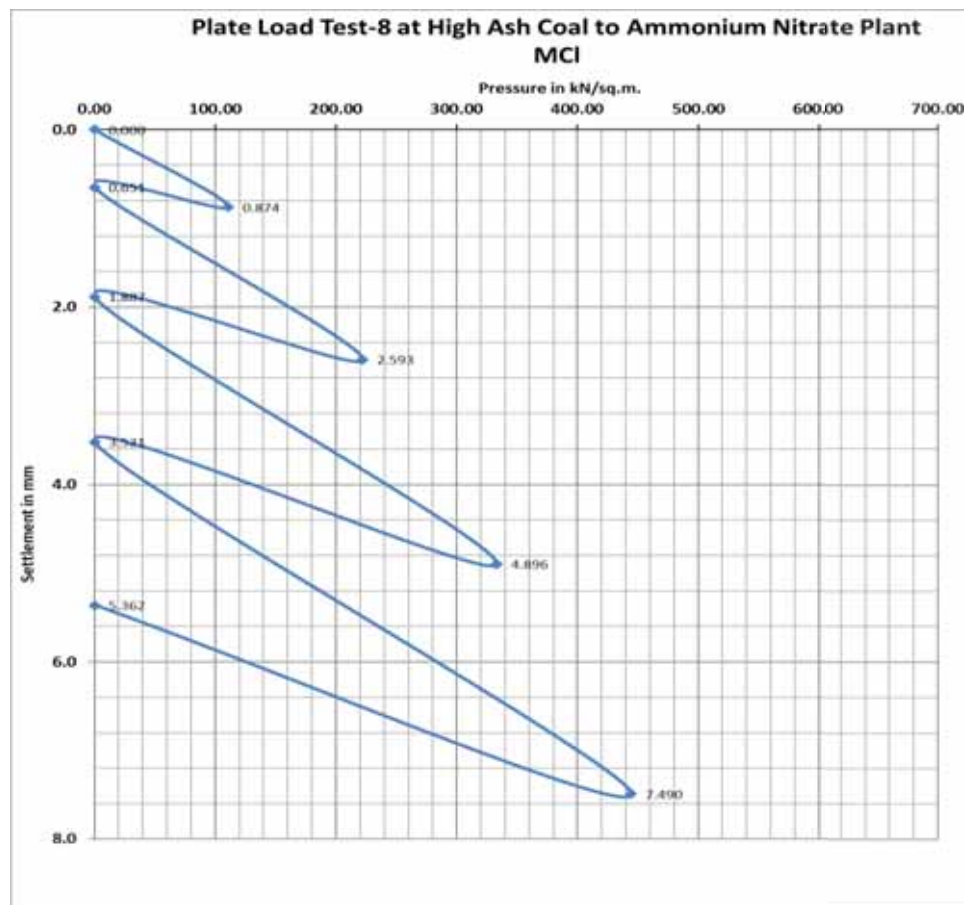
$$C_t = 0.5 \times C_u = 0.5 \times 2.26 \times 10^4 \text{ Kn/m}^3 \\ = 1.13 \times 10^4 \text{ Kn/m}^3$$

$$C_q = 1.73 \times C_u = 1.73 \times 2.26 \times 10^4 \text{ Kn/m}^3 \\ = 3.90 \times 10^4 \text{ Kn/m}^3$$

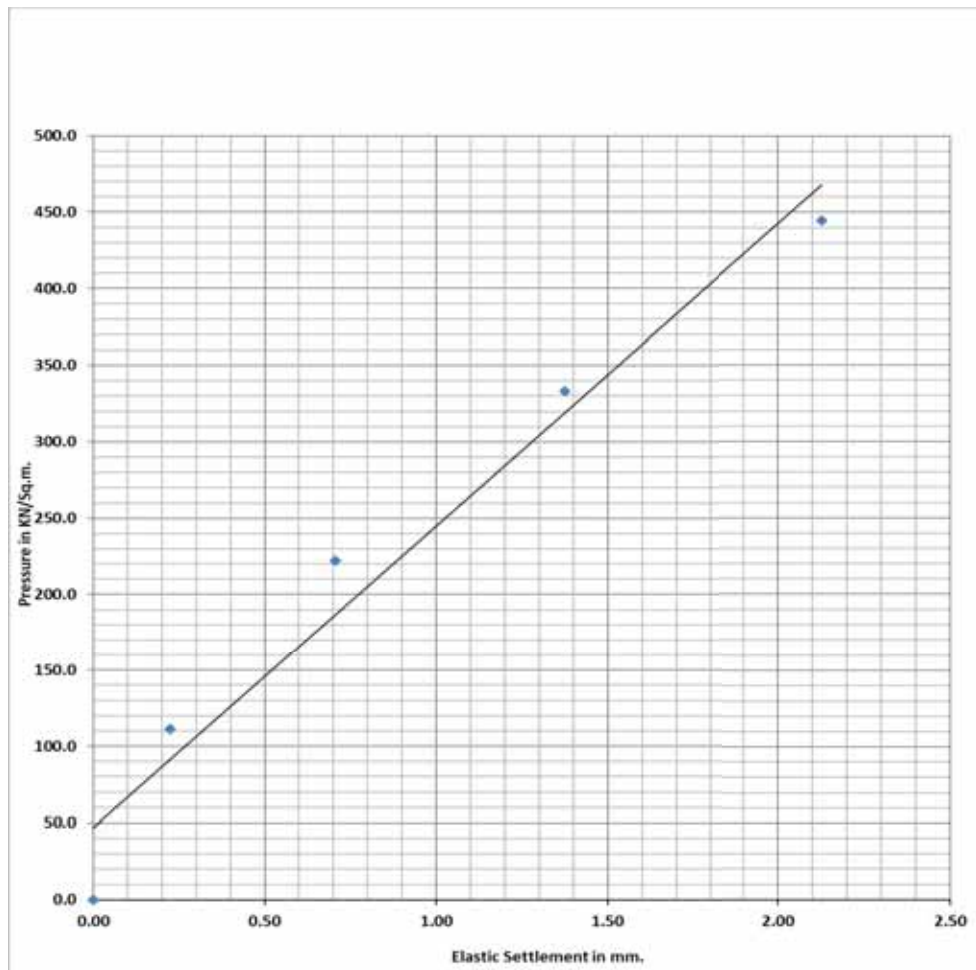
TEST NO 8

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.874
0.00	0.651
222.2	2.593
0.00	1.887
333.3	4.896
0.00	3.521
444.4	7.490
0.00	5.362



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.223
222.2	0.706
333.3	1.375
444.4	2.128



Thus, for 4 m² base area

$$C_u = 19.7 \times 10^4 \times \sqrt{0.09/4} = 2.95 \times 10^4 \text{ Kn/m}^3$$

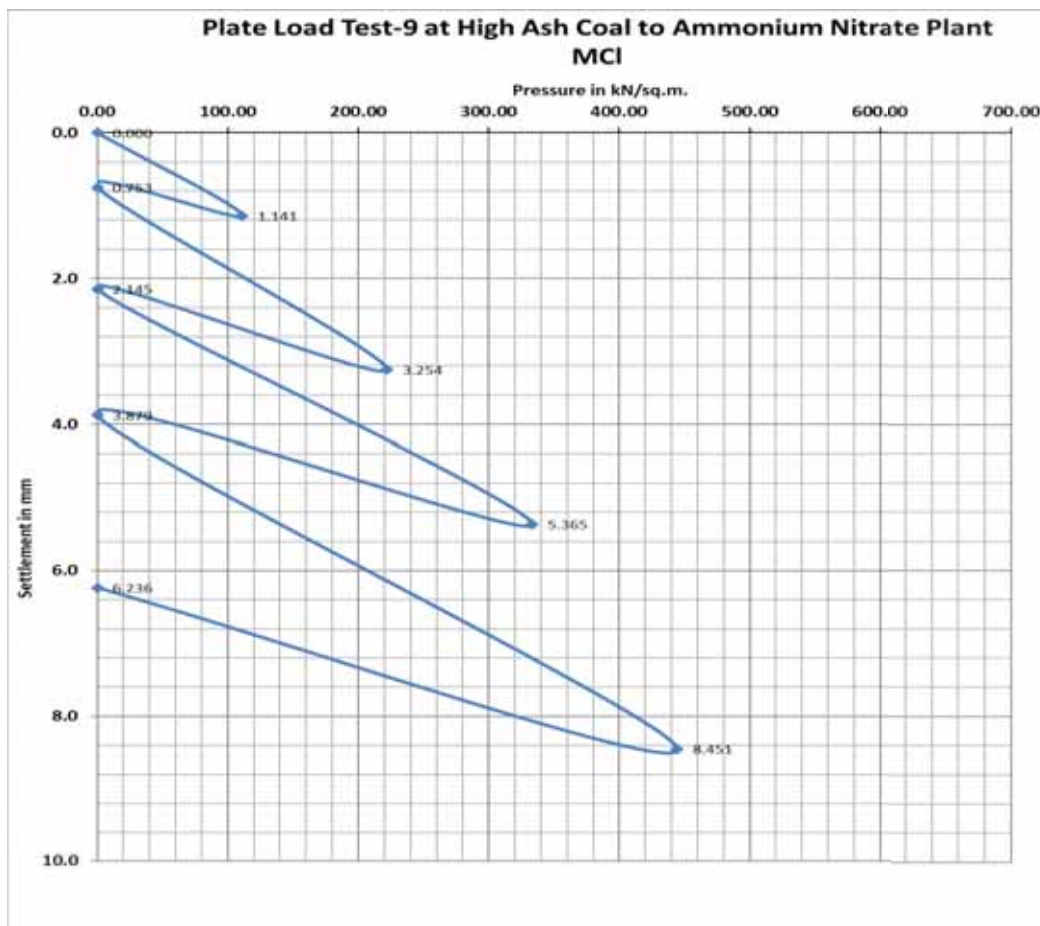
$$C_t = 0.5 \times C_u = 0.5 \times 2.95 \times 10^4 \text{ Kn/m}^3 \\ = 1.47 \times 10^4 \text{ Kn/m}^3$$

$$C_q = 1.73 \times C_u = 1.73 \times 2.95 \times 10^4 \text{ Kn/m}^3 \\ = 5.10 \times 10^4 \text{ Kn/m}^3$$

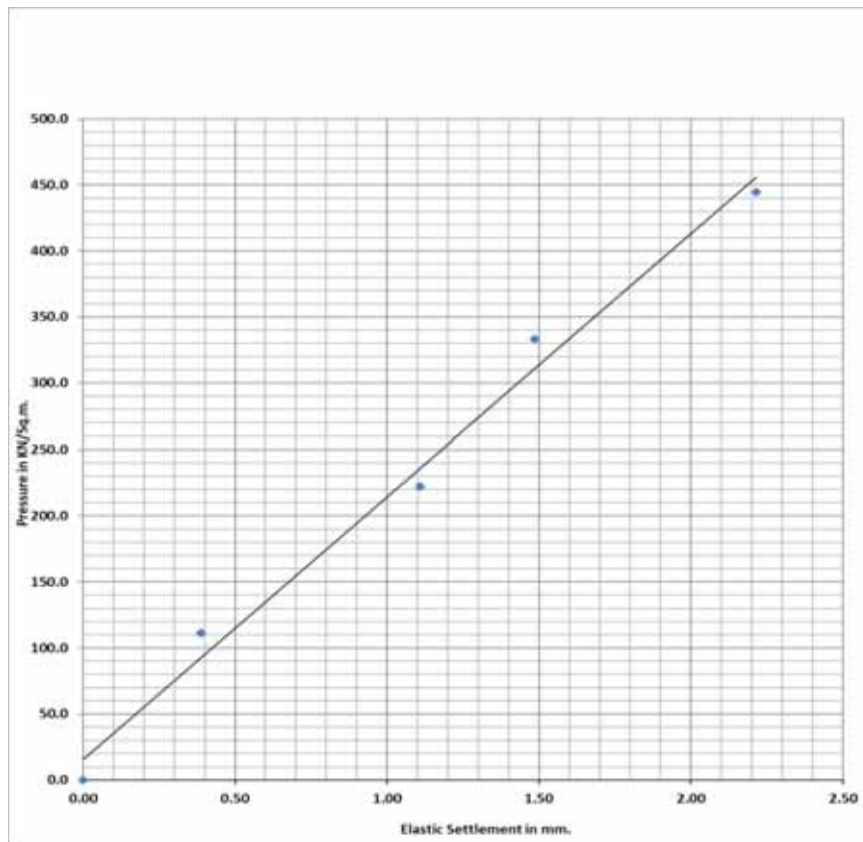
TEST NO 9

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.141
0.00	0.753
222.2	3.254
0.00	2.145
333.3	5.365
0.00	3.879
444.4	8.451
0.00	6.236



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.388
222.2	1.109
333.3	1.486
444.4	2.215



Thus, for 4 m² base area

$$C_u = 19.8 \times 10^4 \times \sqrt{0.09/4} = 2.97 \times 10^4 \text{ Kn/m}^3$$

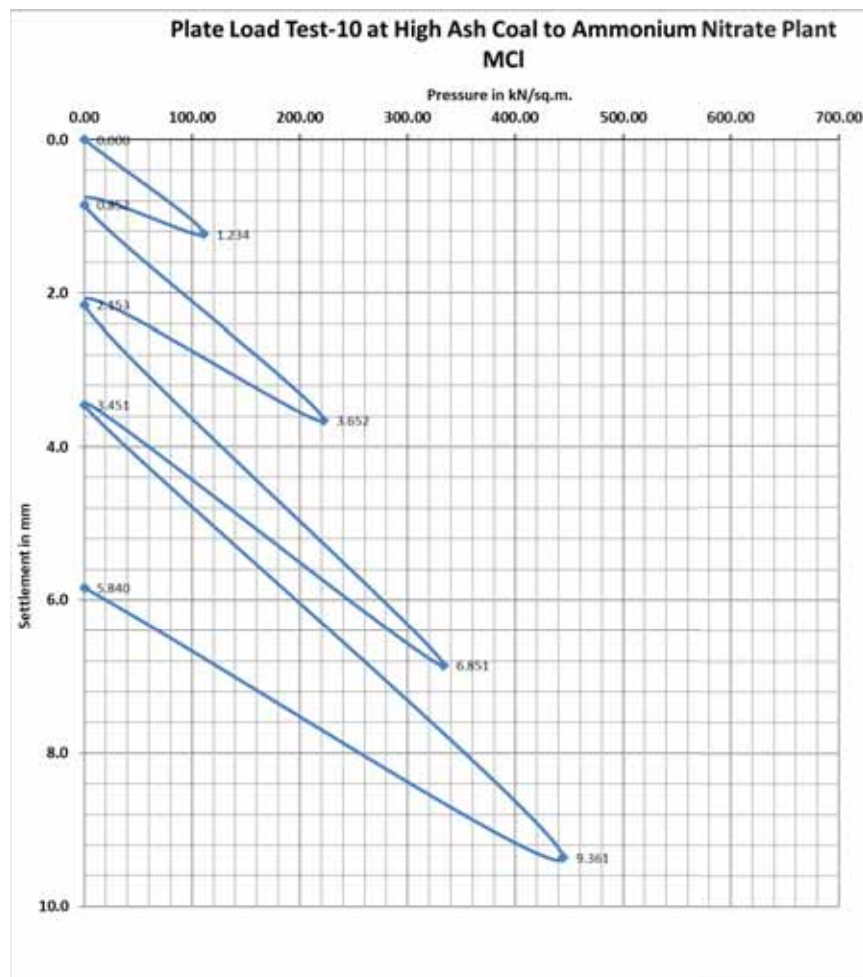
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.97 \times 10^4 \text{ Kn/m}^3 \\ &= 1.48 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.97 \times 10^4 \text{ Kn/m}^3 \\ &= 5.13 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

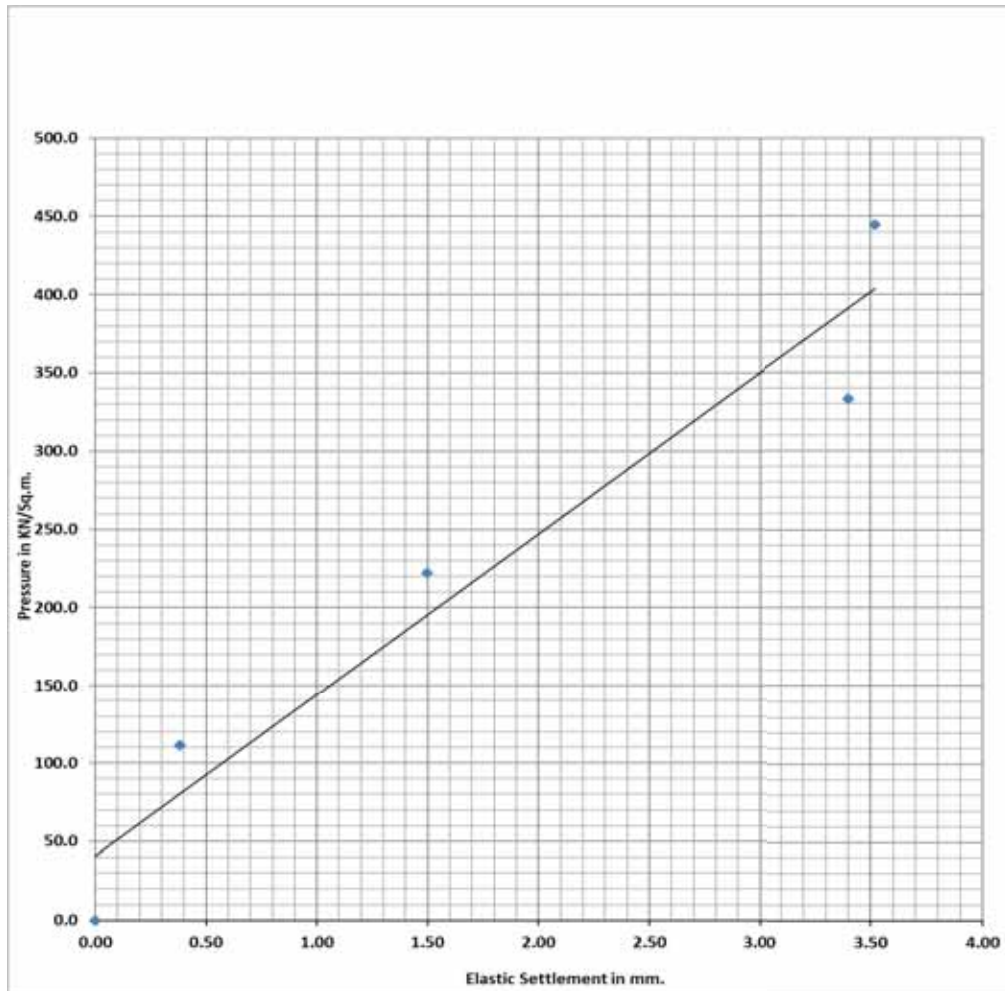
TEST NO 10

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.234
0.00	0.852
222.2	3.652
0.00	2.153
333.3	6.851
0.00	3.451
444.4	9.361
0.00	5.840



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.382
222.2	1.499
333.3	3.400
444.4	3.521



Thus, for 4 m² base area

$$C_u = 10.2 \times 10^4 \times \sqrt{0.09/4} = 1.53 \times 10^4 \text{ Kn/m}^3$$

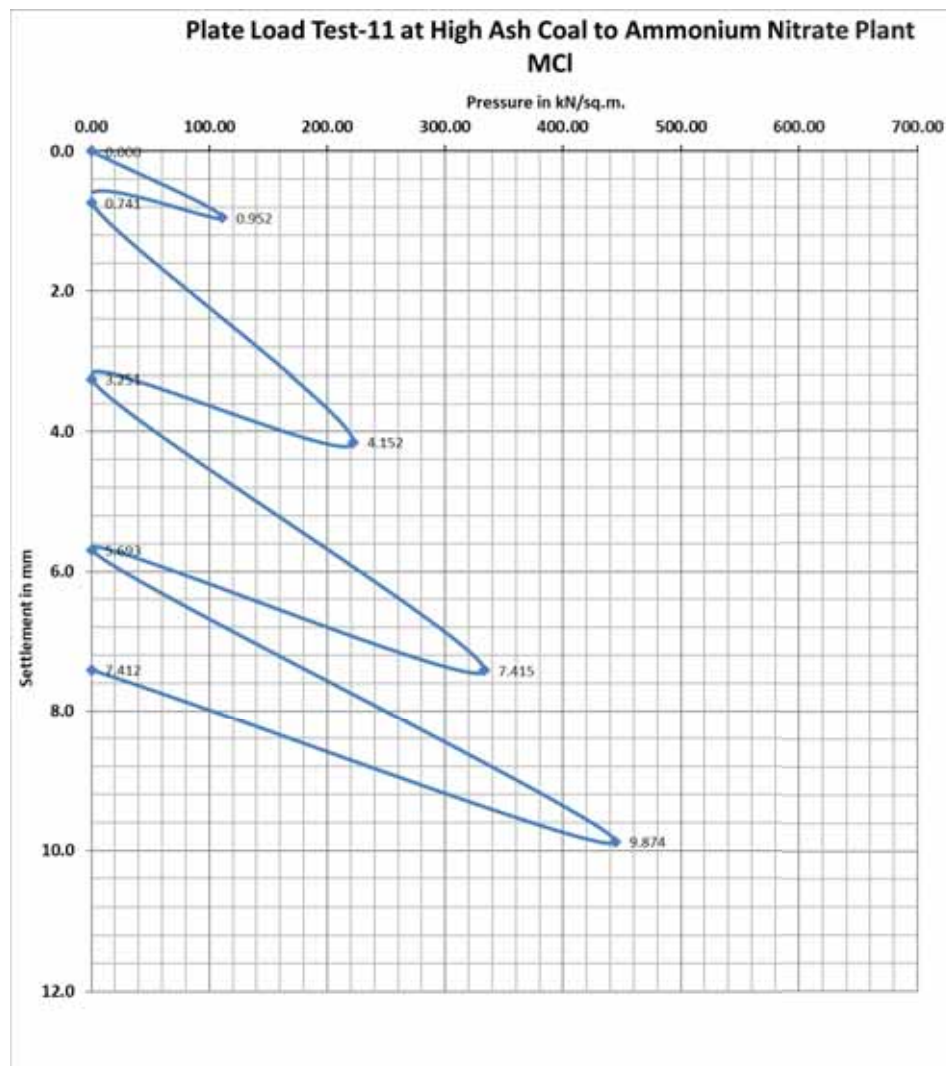
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 1.53 \times 10^4 \text{ Kn/m}^3 \\ &= 7.65 \times 10^3 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 1.53 \times 10^4 \text{ Kn/m}^3 \\ &= 2.64 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

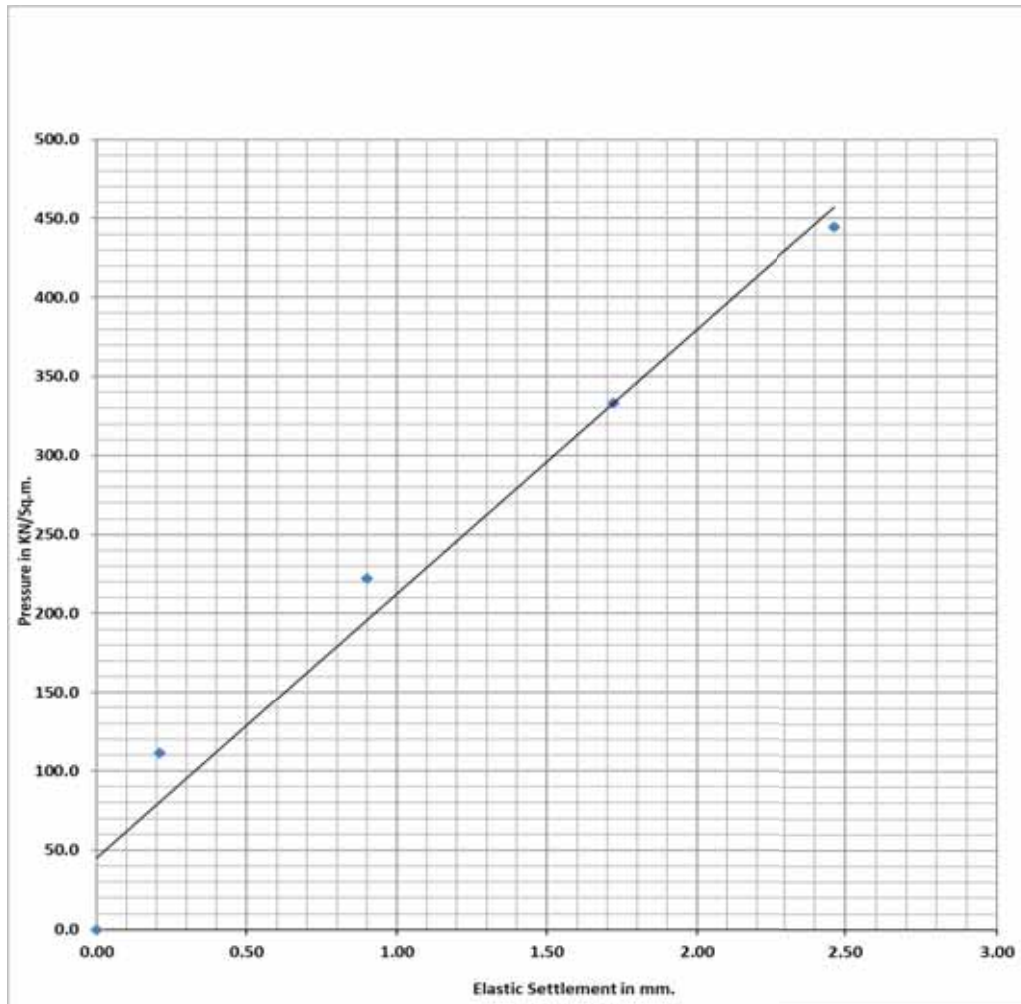
TEST NO 11

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.952
0.00	0.741
222.2	4.152
0.00	3.251
333.3	7.415
0.00	5.693
444.4	9.874
0.00	7.412



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.211
222.2	0.901
333.3	1.722
444.4	2.462



Thus, for 4 m² base area

$$C_u = 16.7 \times 10^4 \times \sqrt{0.09/4} = 2.50 \times 10^4 \text{ Kn/m}^3$$

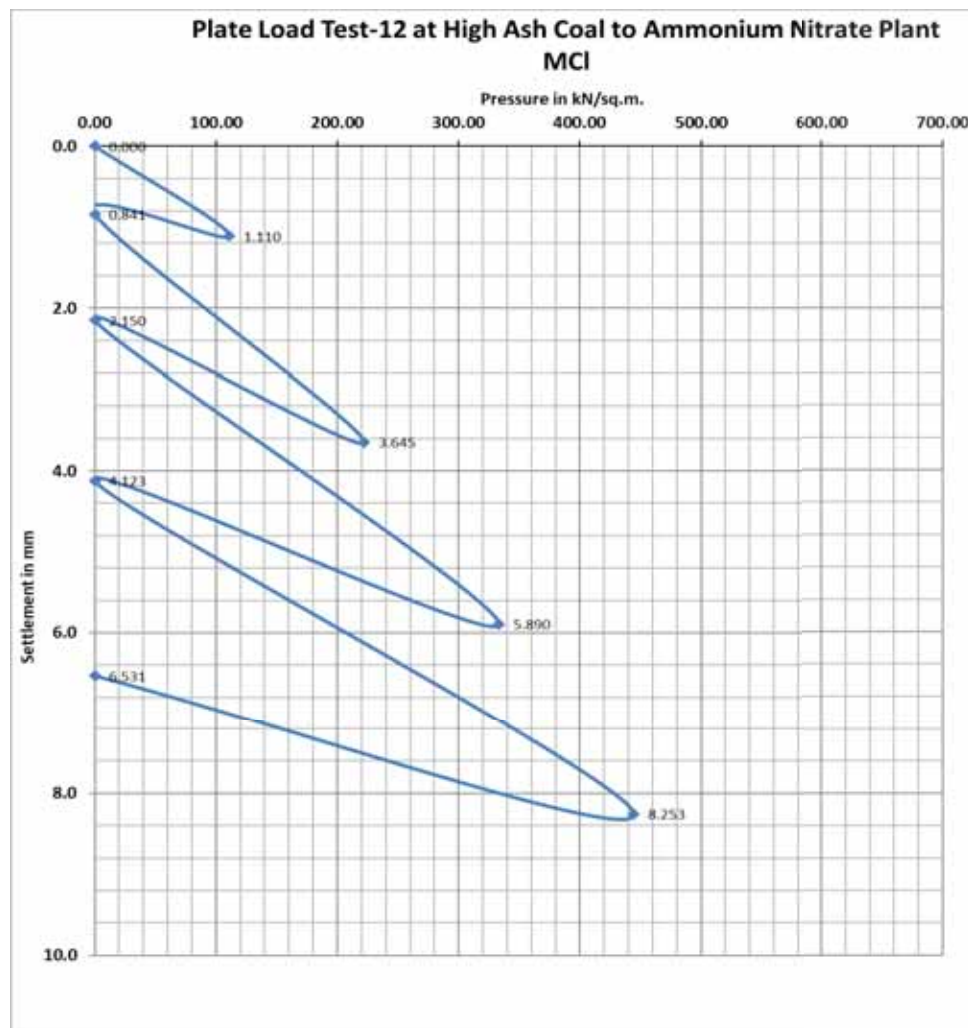
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.50 \times 10^4 \text{ Kn/m}^3 \\ &= 1.25 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.53 \times 10^4 \text{ Kn/m}^3 \\ &= 4.37 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

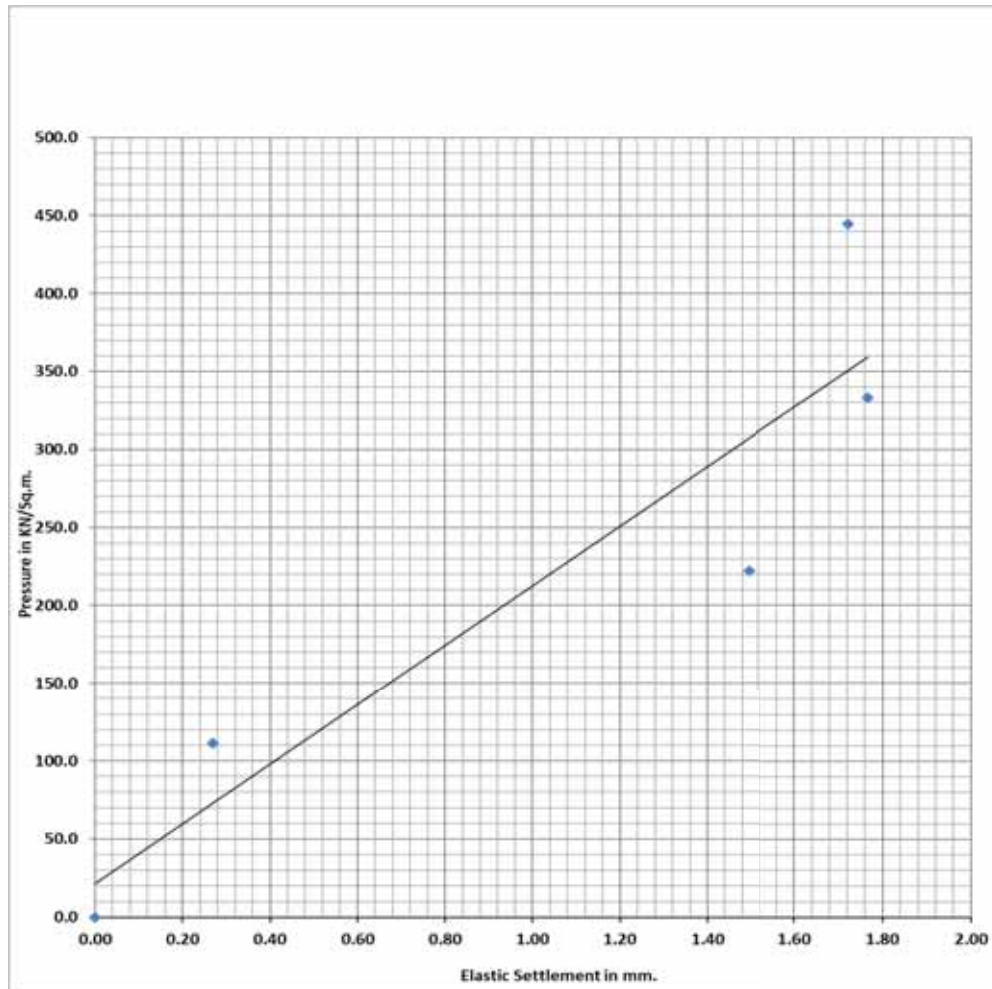
TEST NO 12

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.110
0.00	0.841
222.2	3.645
0.00	2.150
333.3	5.890
0.00	4.123
444.4	8.253
0.00	6.531



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.269
222.2	1.495
333.3	1.767
444.4	1.722



Thus, for 4 m² base area

$$C_u = 19.0 \times 10^4 \times \sqrt{0.09/4} = 2.85 \times 10^4 \text{ Kn/m}^3$$

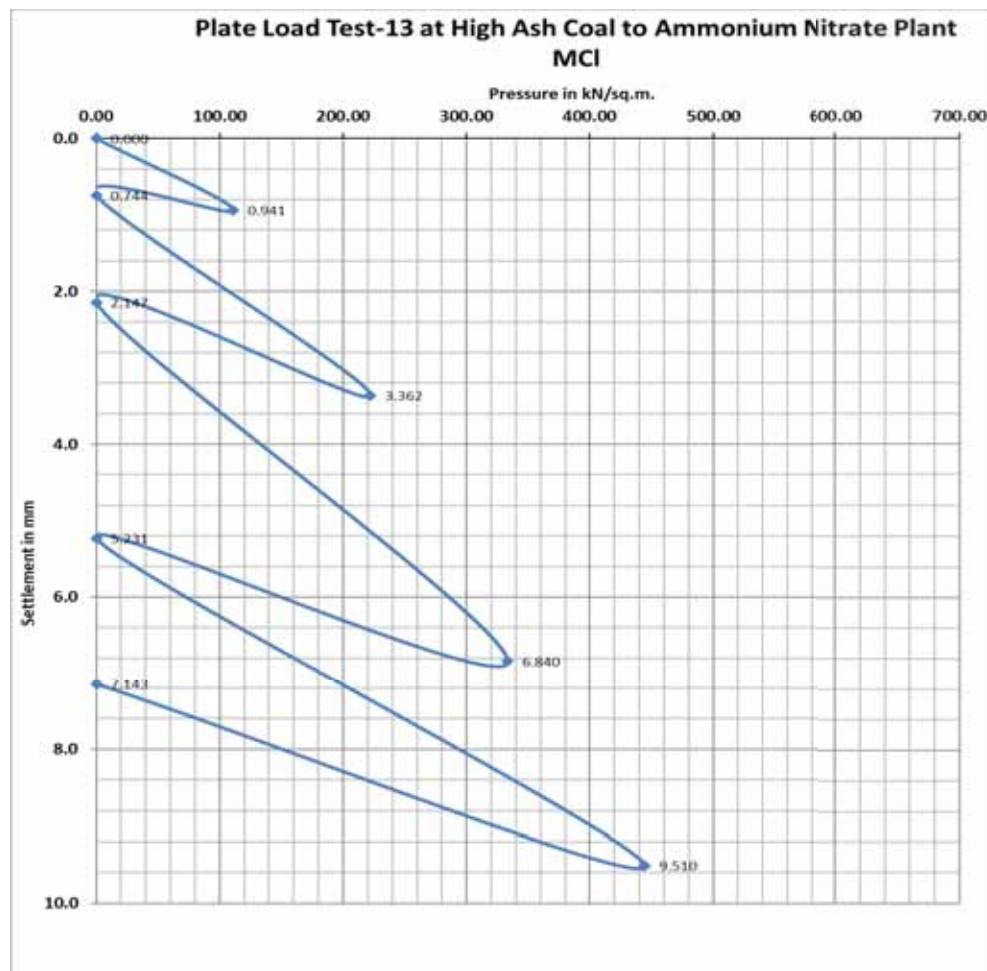
$$C_t = 0.5 \times C_u = 0.5 \times 2.85 \times 10^4 \text{ Kn/m}^3 \\ = 1.42 \times 10^4 \text{ Kn/m}^3$$

$$C_q = 1.73 \times C_u = 1.73 \times 2.85 \times 10^4 \text{ Kn/m}^3 \\ = 4.93 \times 10^4 \text{ Kn/m}^3$$

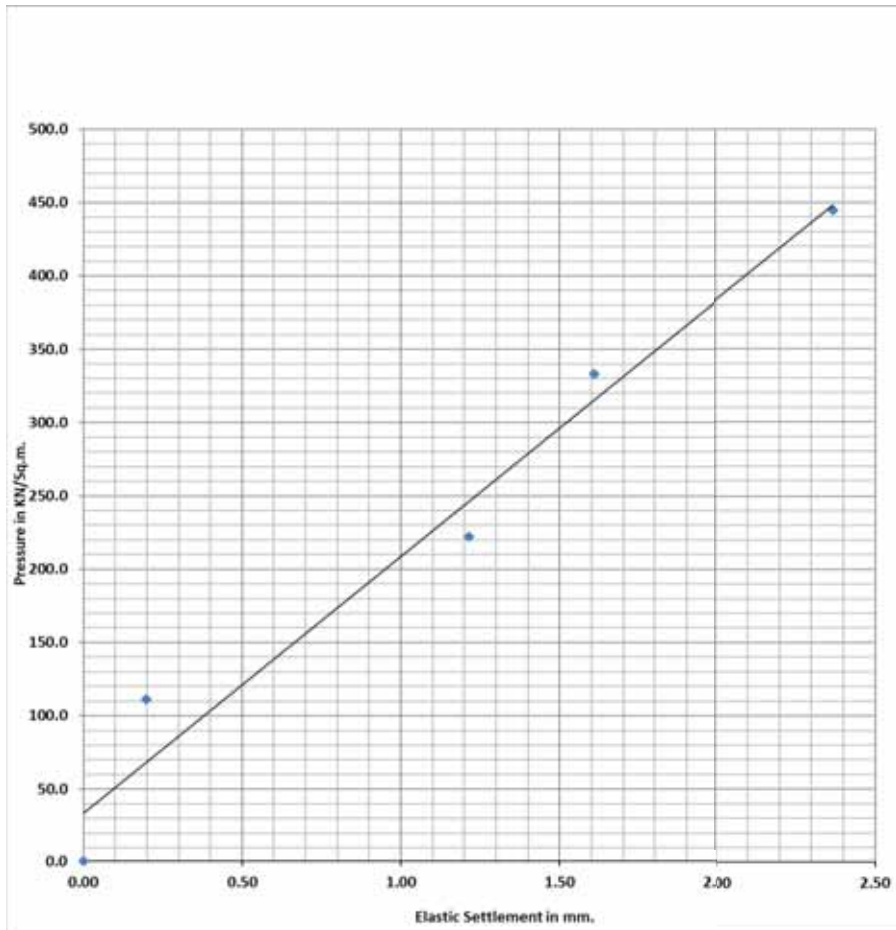
TEST NO 13

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.941
0.00	0.744
222.2	3.362
0.00	2.147
333.3	6.840
0.00	5.231
444.4	9.510
0.00	7.143



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.197
222.2	1.215
333.3	1.609
444.4	2.367



Thus, for 4 m² base area

$$C_u = 17.5 \times 10^4 \times \sqrt{0.09/4} = 2.62 \times 10^4 \text{ Kn/m}^3$$

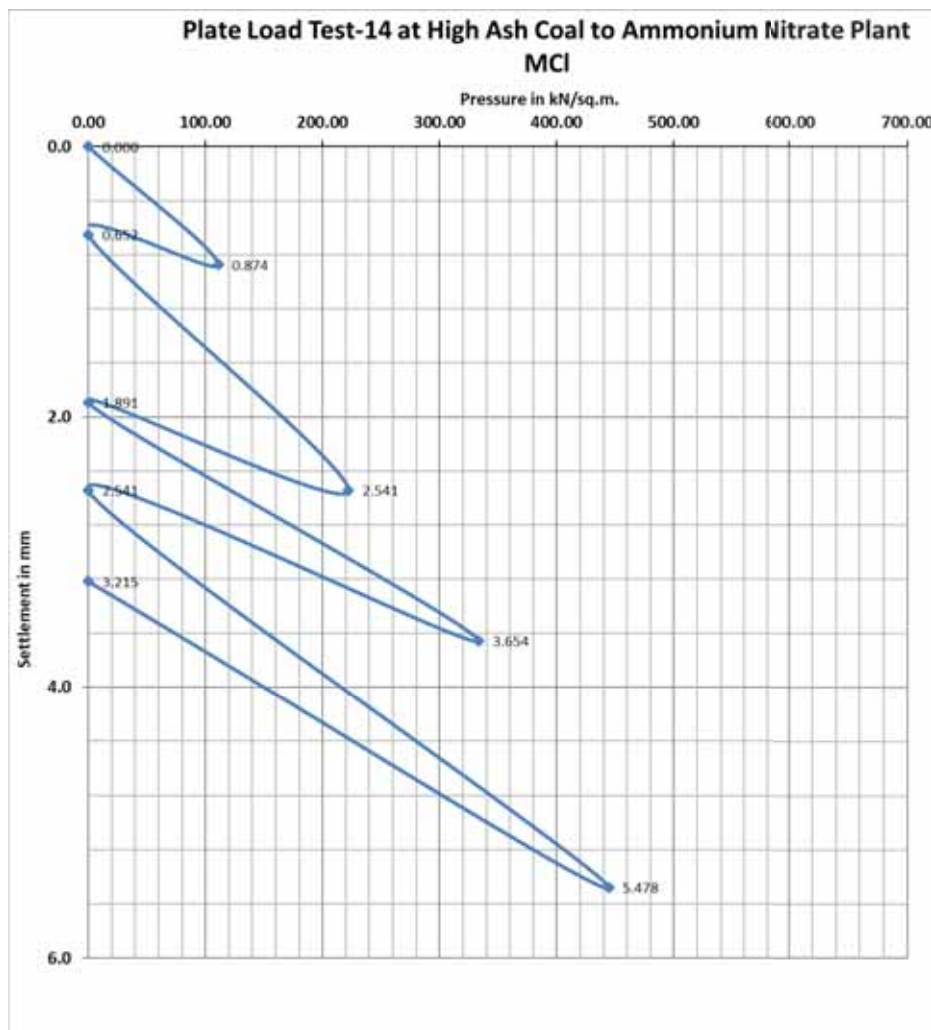
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.62 \times 10^4 \text{ Kn/m}^3 \\ &= 1.31 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.62 \times 10^4 \text{ Kn/m}^3 \\ &= 4.53 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

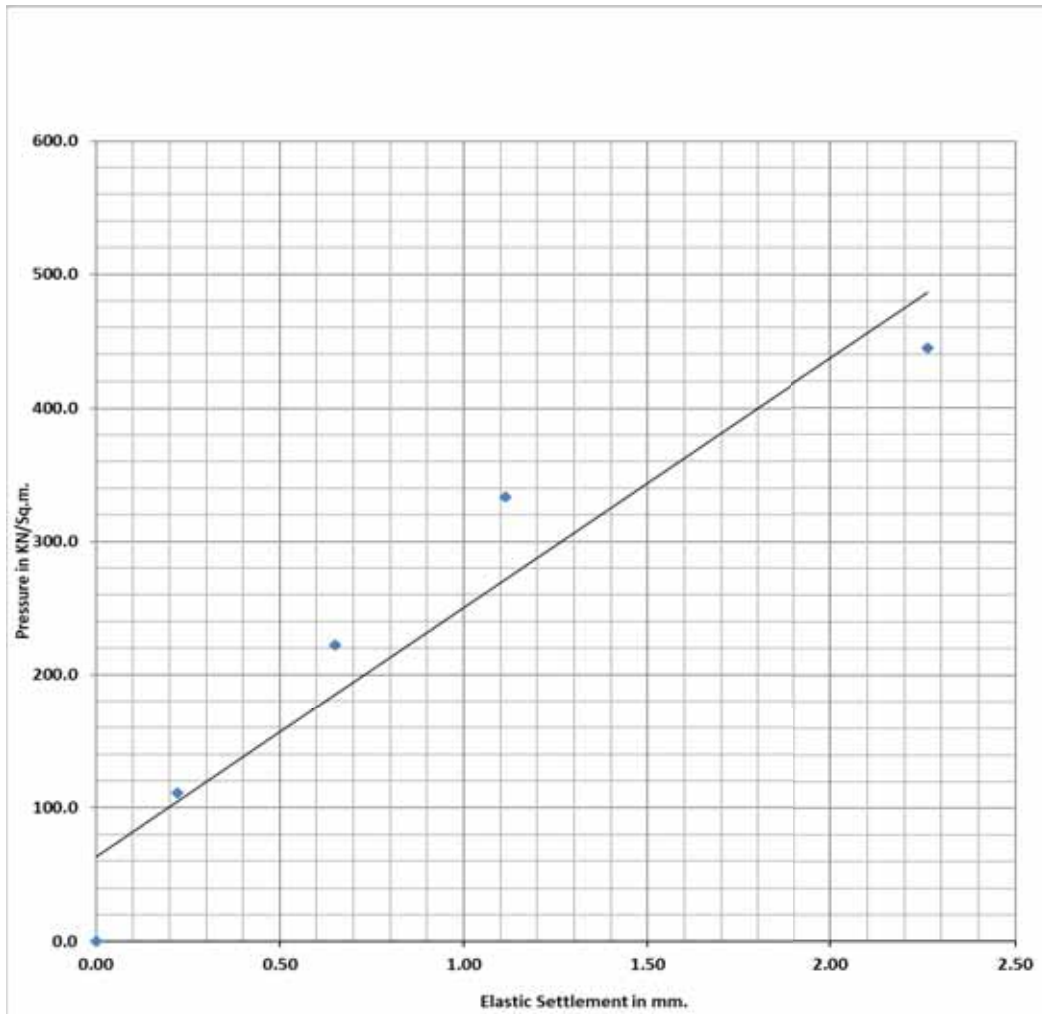
TEST NO 14

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.874
0.00	0.652
222.2	2.541
0.00	1.891
333.3	3.654
0.00	2.541
444.4	5.476
0.00	3.215



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.222
222.2	0.650
333.3	1.113
444.4	2.263



Thus, for 4 m² base area

$$C_u = 18.6 \times 10^4 \times \sqrt{0.09/4} = 2.79 \times 10^4 \text{ Kn/m}^3$$

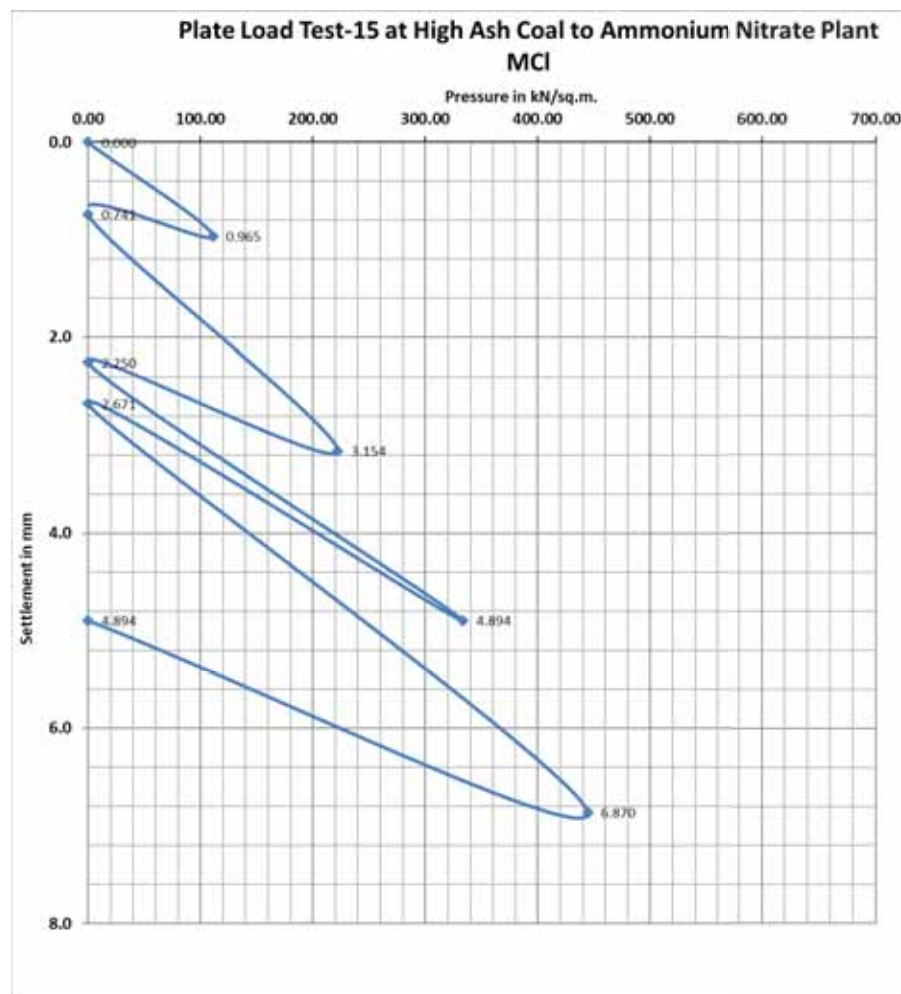
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.79 \times 10^4 \text{ Kn/m}^3 \\ &= 1.39 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.79 \times 10^4 \text{ Kn/m}^3 \\ &= 4.82 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

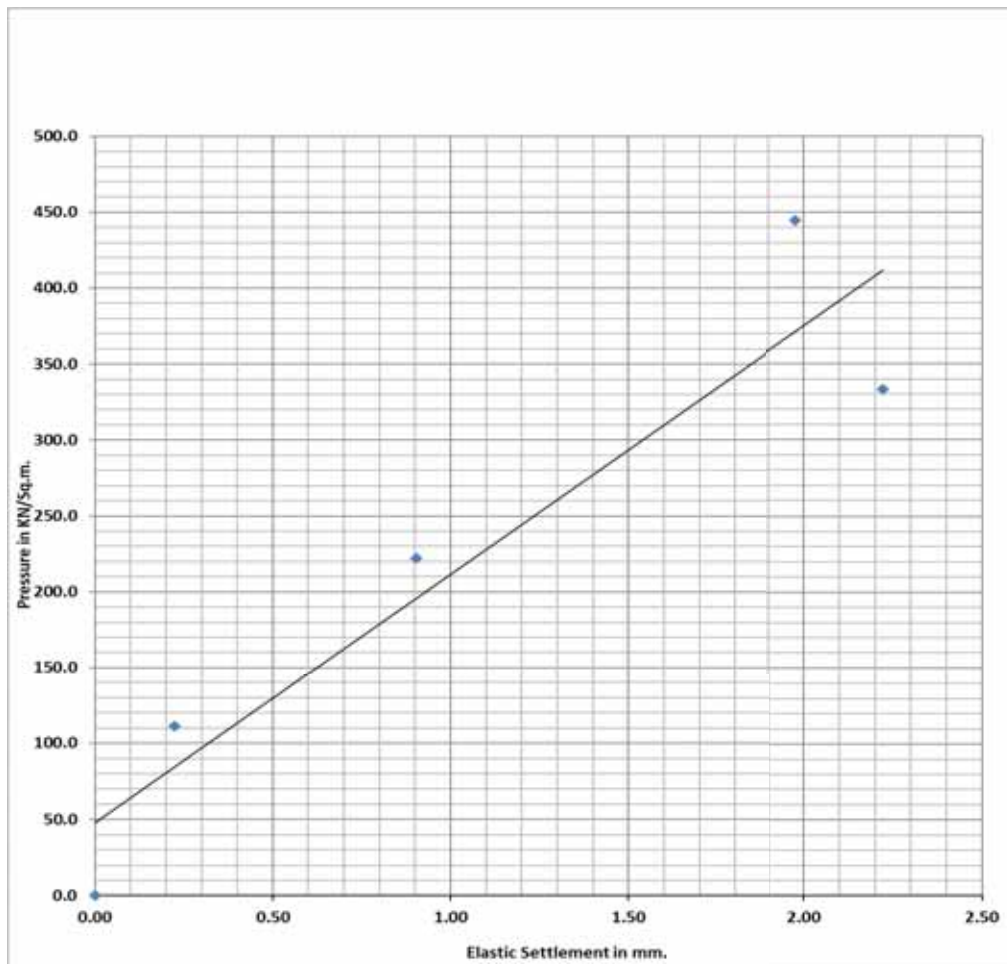
TEST NO 15

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.965
0.00	0.741
222.2	3.154
0.00	2.250
333.3	4.894
0.00	2.671
444.4	6.870
0.00	4.894



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.224
222.2	0.904
333.3	2.223
444.4	1.976



Thus, for 4 m² base area

$$C_u = 16.3 \times 10^4 \times \sqrt{0.09/4} = 2.44 \times 10^4 \text{ Kn/m}^3$$

$$C_t = 0.5 \times C_u = 0.5 \times 2.44 \times 10^4 \text{ Kn/m}^3 \\ = 1.22 \times 10^4 \text{ Kn/m}^3$$

$$C_q = 1.73 \times C_u = 1.73 \times 2.44 \times 10^4 \text{ Kn/m}^3 \\ = 4.22 \times 10^4 \text{ Kn/m}^3$$

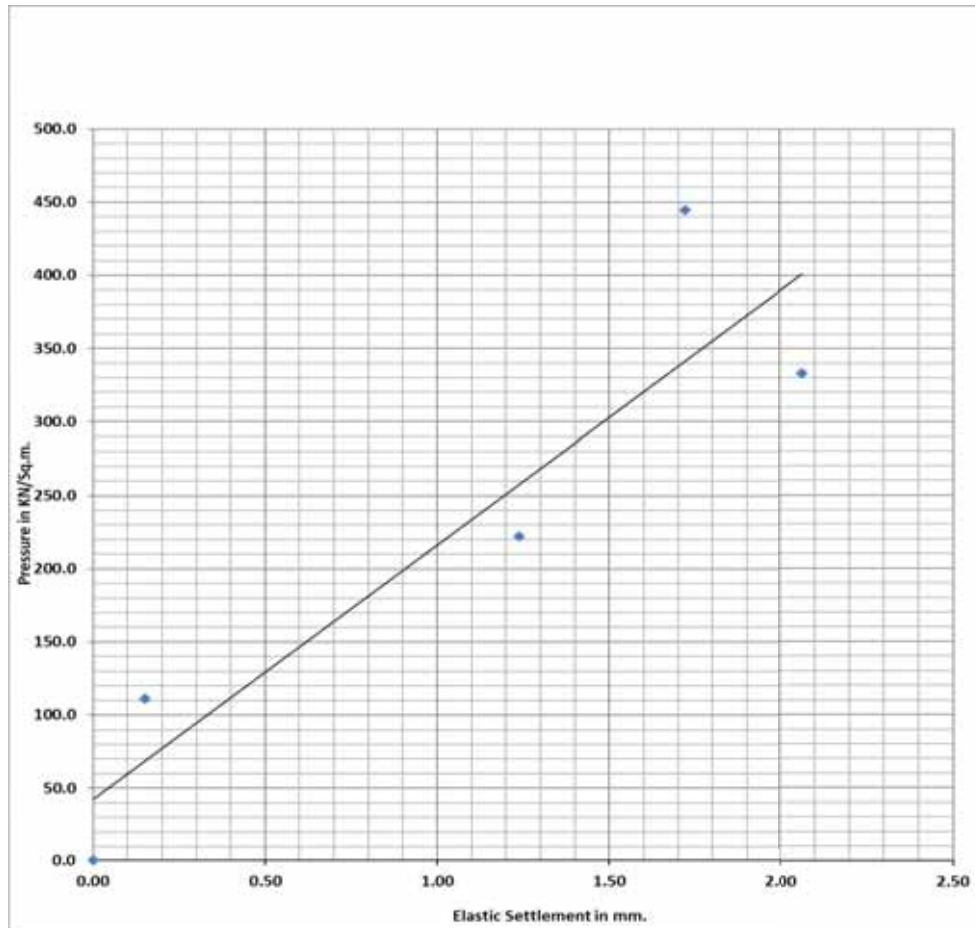
TEST NO 16

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.031
0.00	0.880
222.2	3.651
0.00	2.413
333.3	5.650
0.00	3.587
444.4	8.590
0.00	6.870



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.151
222.2	1.238
333.3	2.063
444.4	1.720



Thus, for 4 m² base area

$$C_u = 17.3 \times 10^4 \times \sqrt{0.09/4} = 2.59 \times 10^4 \text{ Kn/m}^3$$

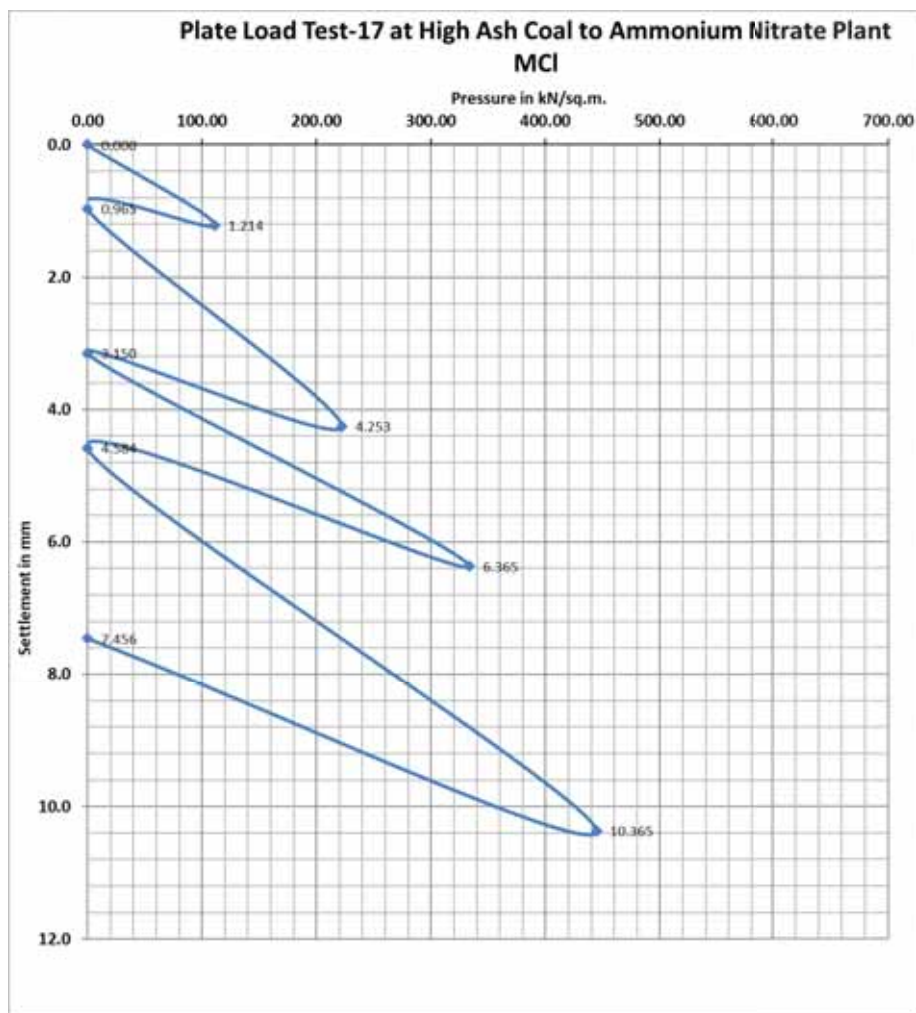
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.59 \times 10^4 \text{ Kn/m}^3 \\ &= 1.29 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.59 \times 10^4 \text{ Kn/m}^3 \\ &= 4.48 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

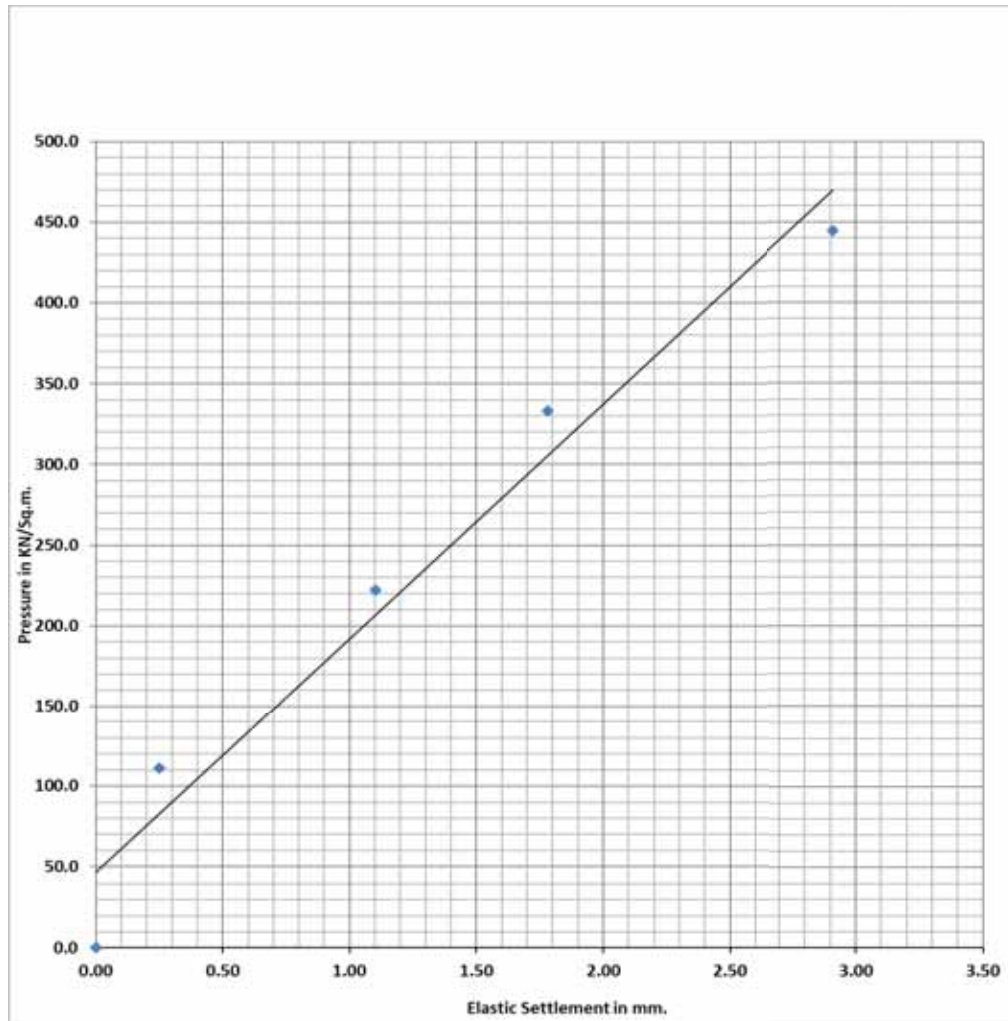
TEST NO 17

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.214
0.00	0.965
222.2	4.253
0.00	3.150
333.3	6.365
0.00	4.584
444.4	10.365
0.00	7.456



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.249
222.2	1.103
333.3	1.781
444.4	2.909



Thus, for 4 m² base area

$$C_u = 14.5 \times 10^4 \times \sqrt{0.09/4} = 2.17 \times 10^4 \text{ Kn/m}^3$$

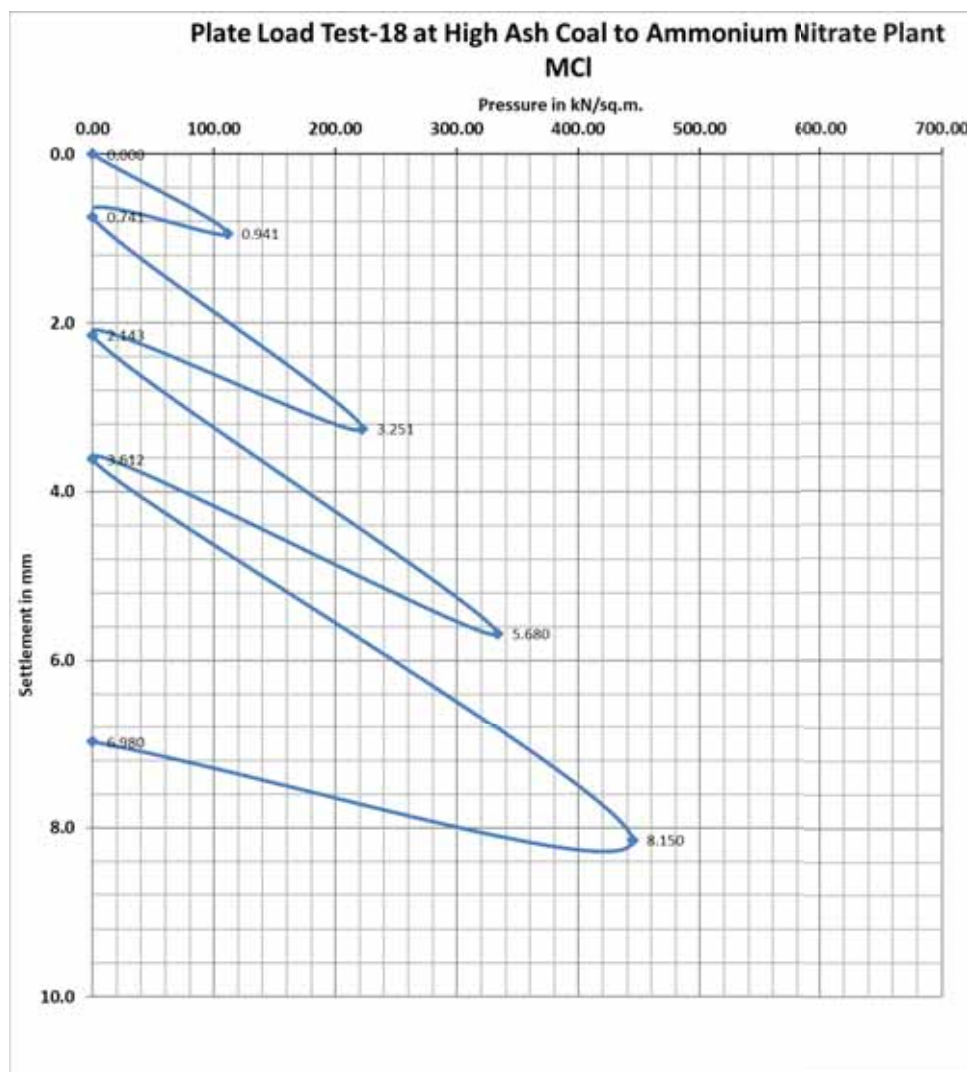
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.17 \times 10^4 \text{ Kn/m}^3 \\ &= 1.08 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.17 \times 10^4 \text{ Kn/m}^3 \\ &= 3.75 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

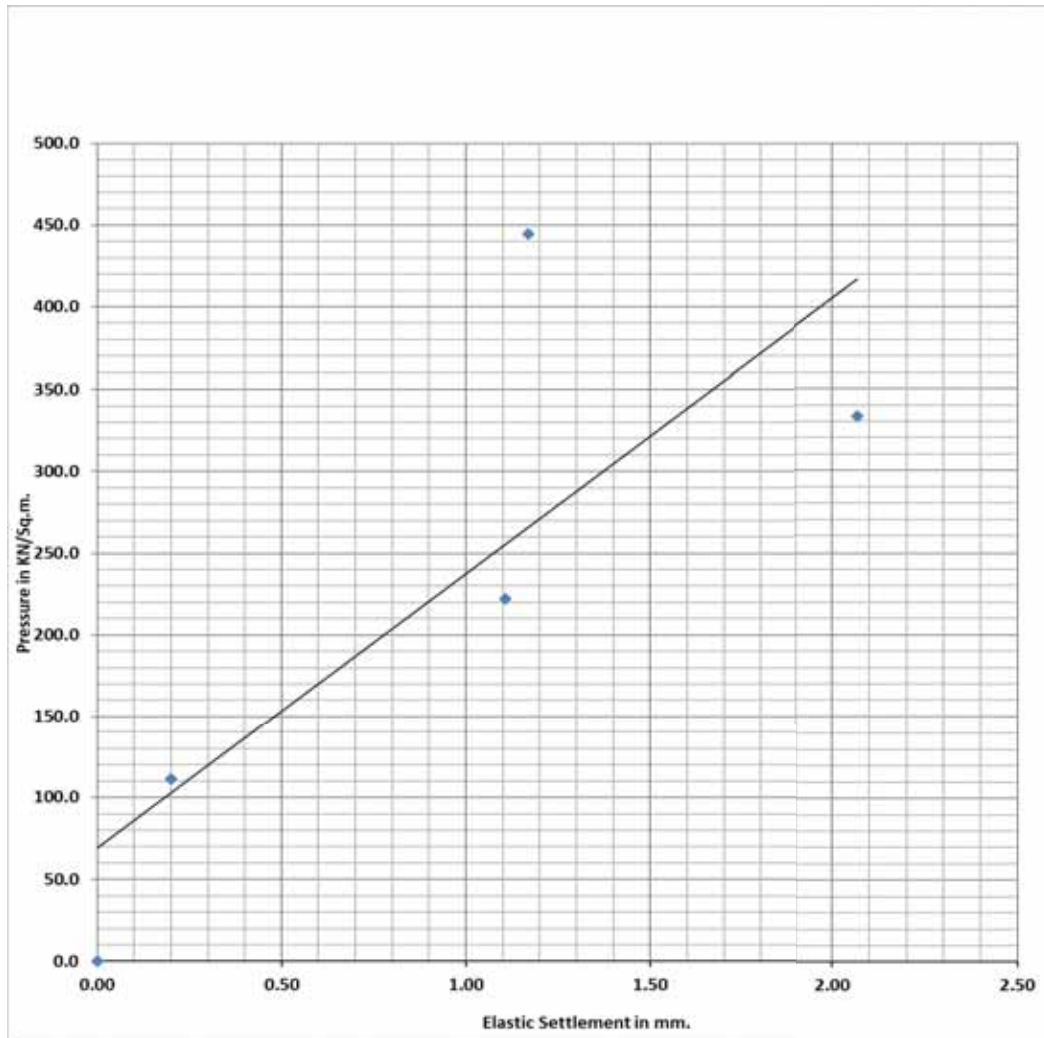
TEST NO 18

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	0.941
0.00	0.741
222.2	3.251
0.00	2.143
333.3	5.680
0.00	3.612
444.4	8.150
0.00	6.980



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.200
222.2	1.108
333.3	2.068
444.4	1.170



Thus, for 4 m² base area

$$C_u = 16.8 \times 10^4 \times \sqrt{0.09/4} = 2.52 \times 10^4 \text{ Kn/m}^3$$

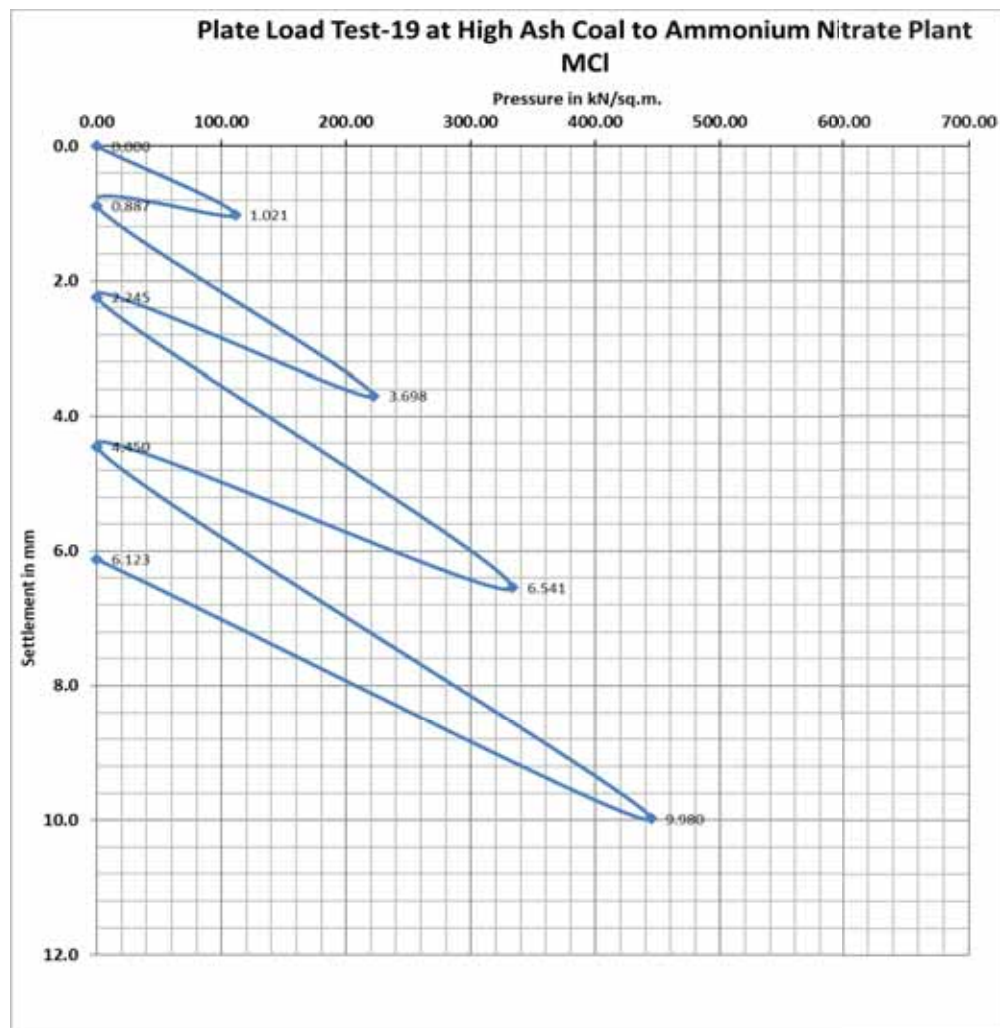
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.52 \times 10^4 \text{ Kn/m}^3 \\ &= 1.26 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.52 \times 10^4 \text{ Kn/m}^3 \\ &= 4.35 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

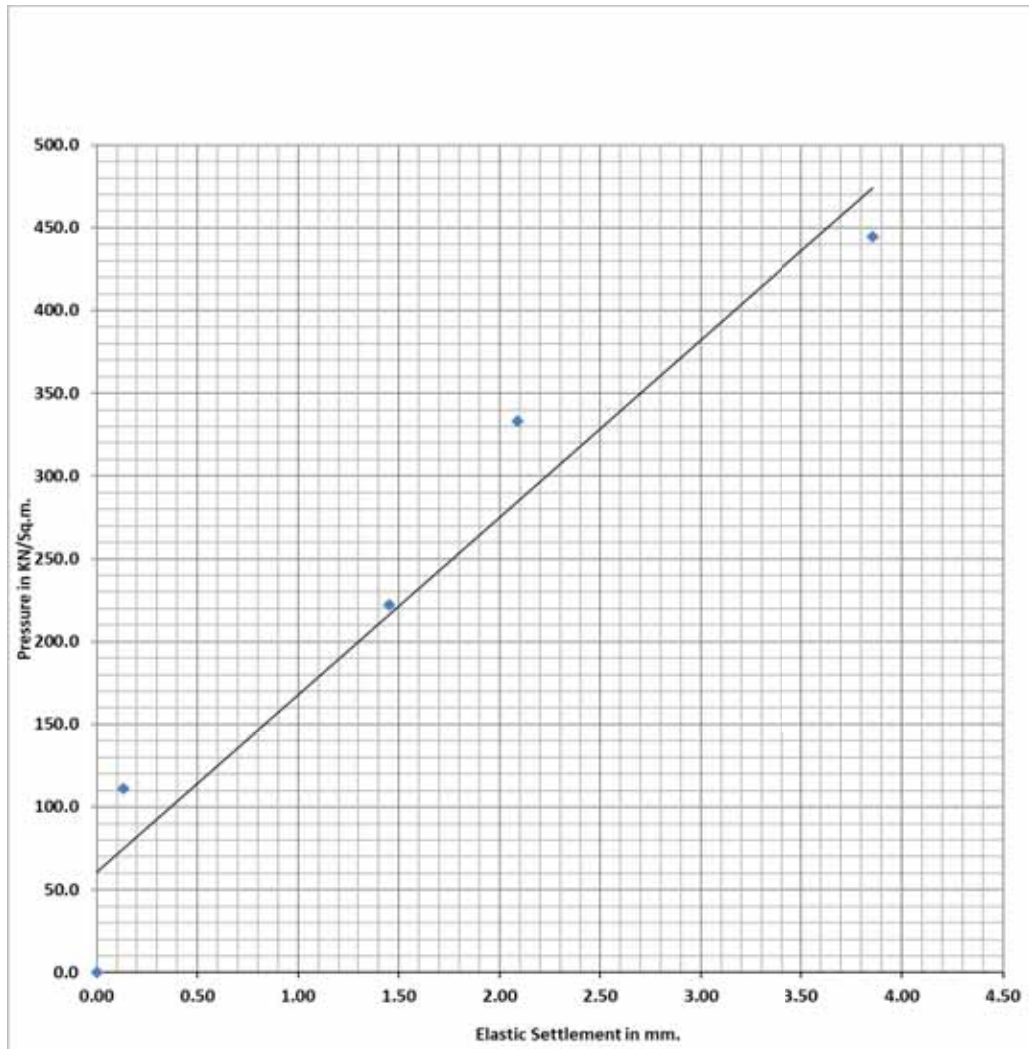
TEST NO 19

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.021
0.00	0.887
222.2	3.698
0.00	2.245
333.3	6.541
0.00	4.450
444.4	9.980
0.00	6.123



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.134
222.2	1.453
333.3	2.091
444.4	3.857



Thus, for 4 m² base area

$$C_u = 10.7 \times 10^4 \times \sqrt{0.09/4} = 1.60 \times 10^4 \text{ Kn/m}^3$$

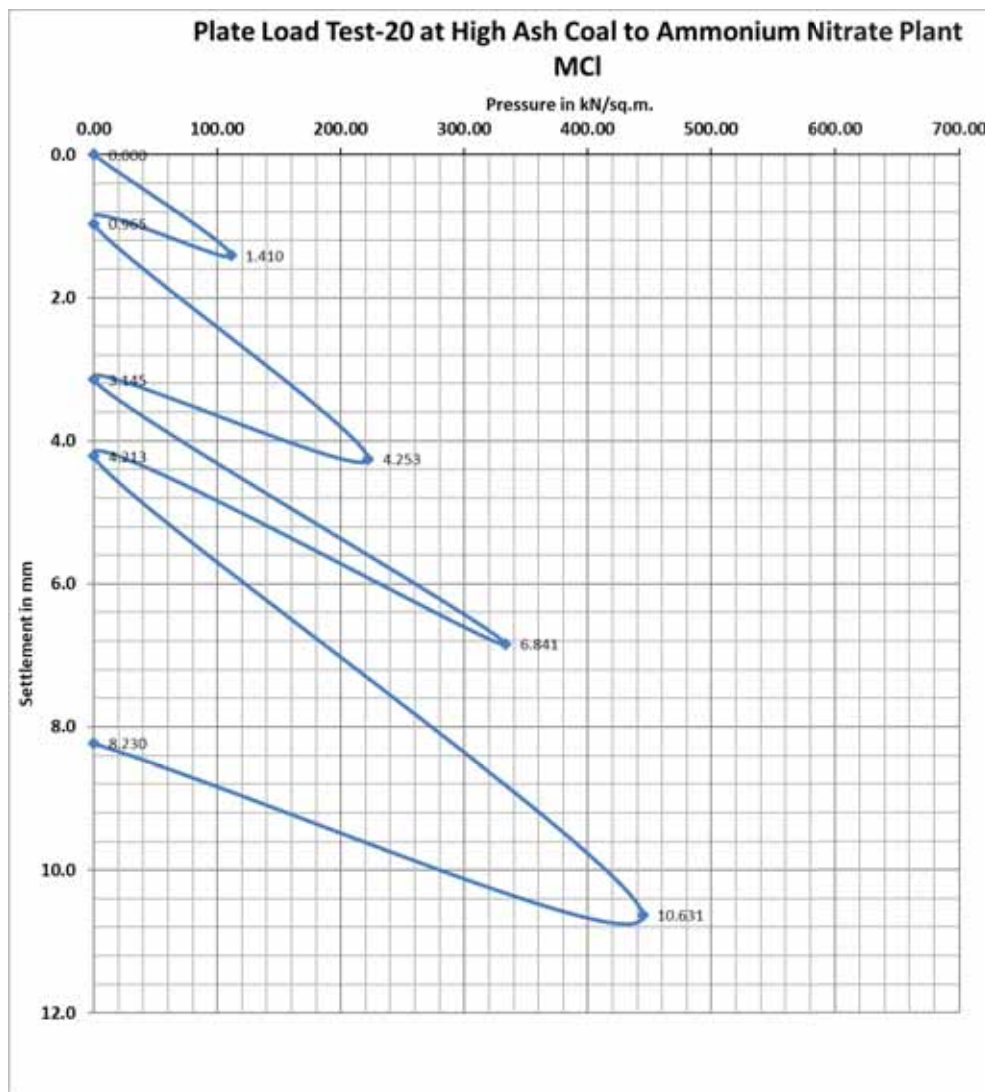
$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 1.60 \times 10^4 \text{ Kn/m}^3 \\ &= 8.02 \times 10^3 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 1.60 \times 10^4 \text{ Kn/m}^3 \\ &= 2.76 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

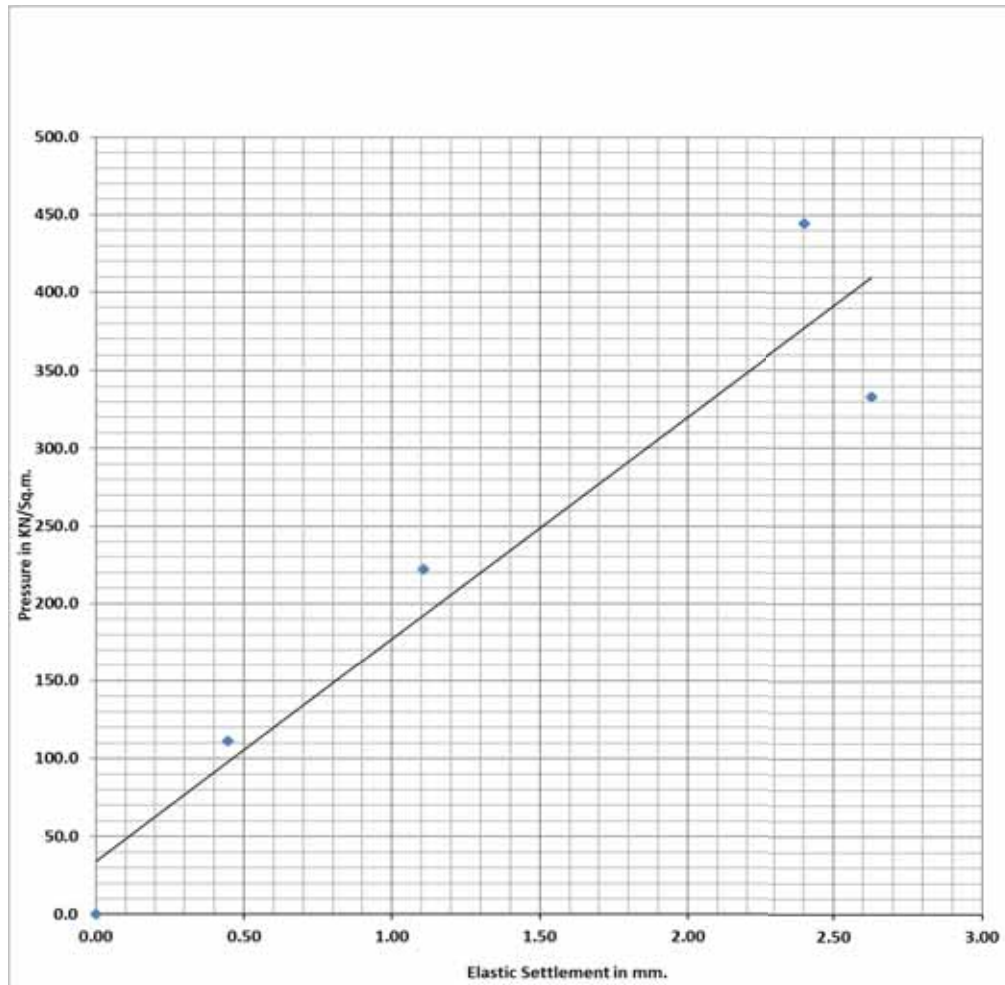
TEST NO 20

LOAD SETTLEMENT CURVE FOR CYCLIC PLATE LOAD TEST

Pressure (Kn/m ²)	Settlement (mm)
111.1	1.410
0.00	0.965
222.2	4.253
0.00	3.145
333.3	6.841
0.00	4.213
444.4	10.631
0.00	8.230



Pressure (Kn/m ²)	Elastic Settlement (mm)
111.1	0.445
222.2	1.108
333.3	2.628
444.4	2.401



Thus, for 4 m² base area

$$C_u = 14.2 \times 10^4 \times \sqrt{0.09/4} = 2.13 \times 10^4 \text{ Kn/m}^3$$

$$\begin{aligned} C_t &= 0.5 \times C_u = 0.5 \times 2.13 \times 10^4 \text{ Kn/m}^3 \\ &= 1.06 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

$$\begin{aligned} C_q &= 1.73 \times C_u = 1.73 \times 2.13 \times 10^4 \text{ Kn/m}^3 \\ &= 3.68 \times 10^4 \text{ Kn/m}^3 \end{aligned}$$

IN-SITU PLATE LOAD TEST

Test No 1

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.270	6.86
2.20	4.660	14.10
3.30	7.105	21.48
4.40	9.875	29.86
5.50	11.350	34.30
6.60	14.320	43.31

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

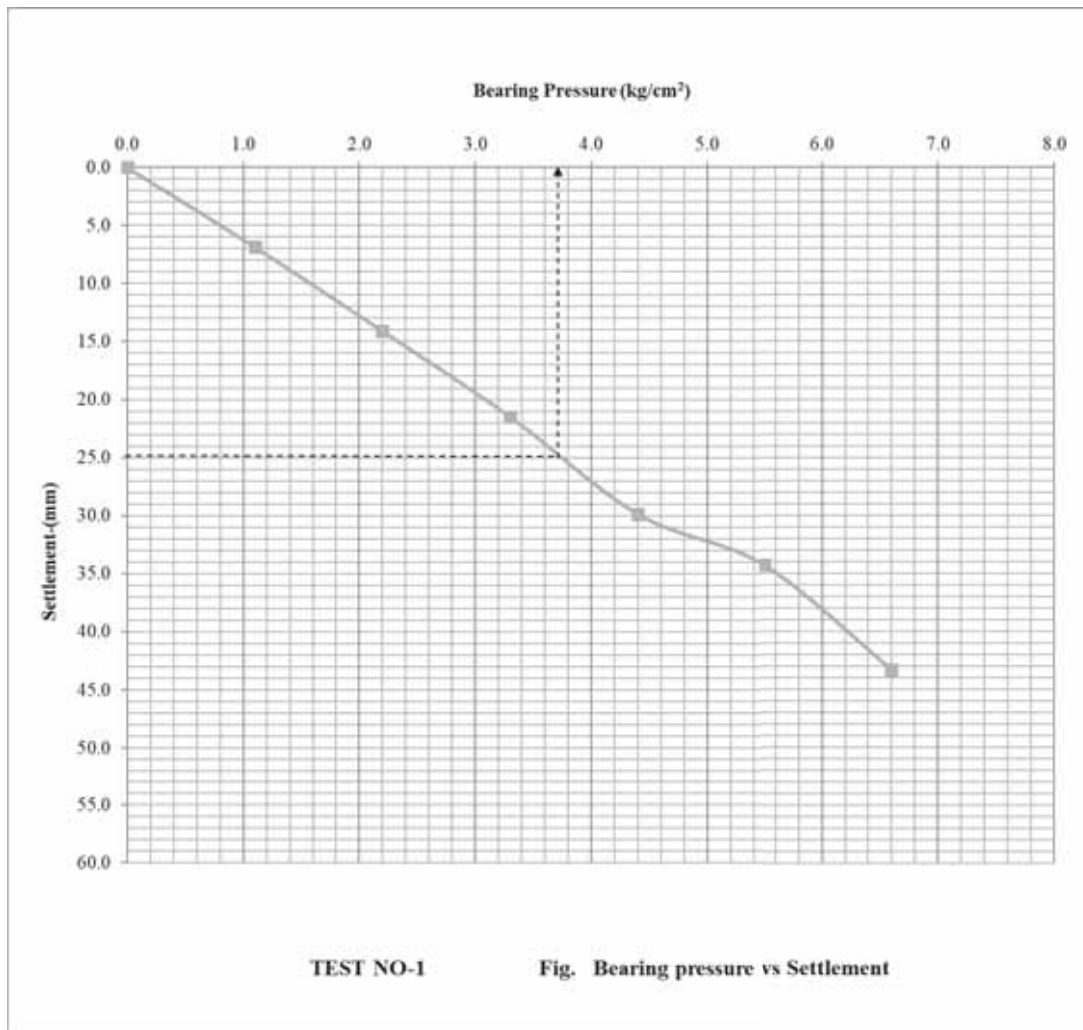
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.7 kg/cm².

Net safe bearing capacity = 36.41 t/m²

Test No 2

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	1.893	5.72
2.20	3.526	10.66
3.30	6.546	19.80
4.40	10.230	30.94
5.50	12.363	37.38
6.60	15.360	46.45

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

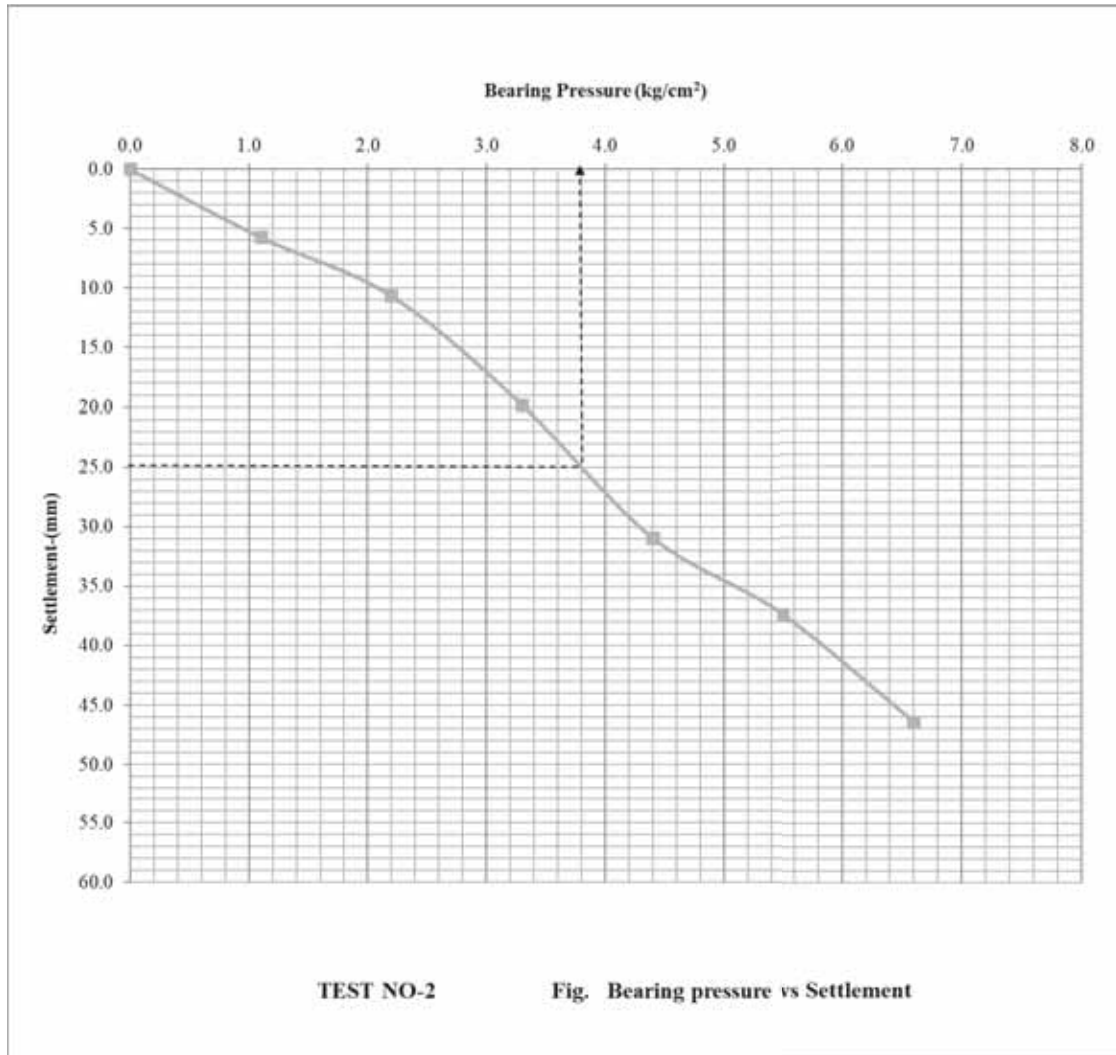
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.8 kg/cm².

Net safe bearing capacity = 37.39 t/m²

Test No 3

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	1.560	4.71
2.20	3.890	11.76
3.30	7.152	21.63
4.40	10.481	31.70
5.50	13.561	41.01
6.60	15.890	48.06

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

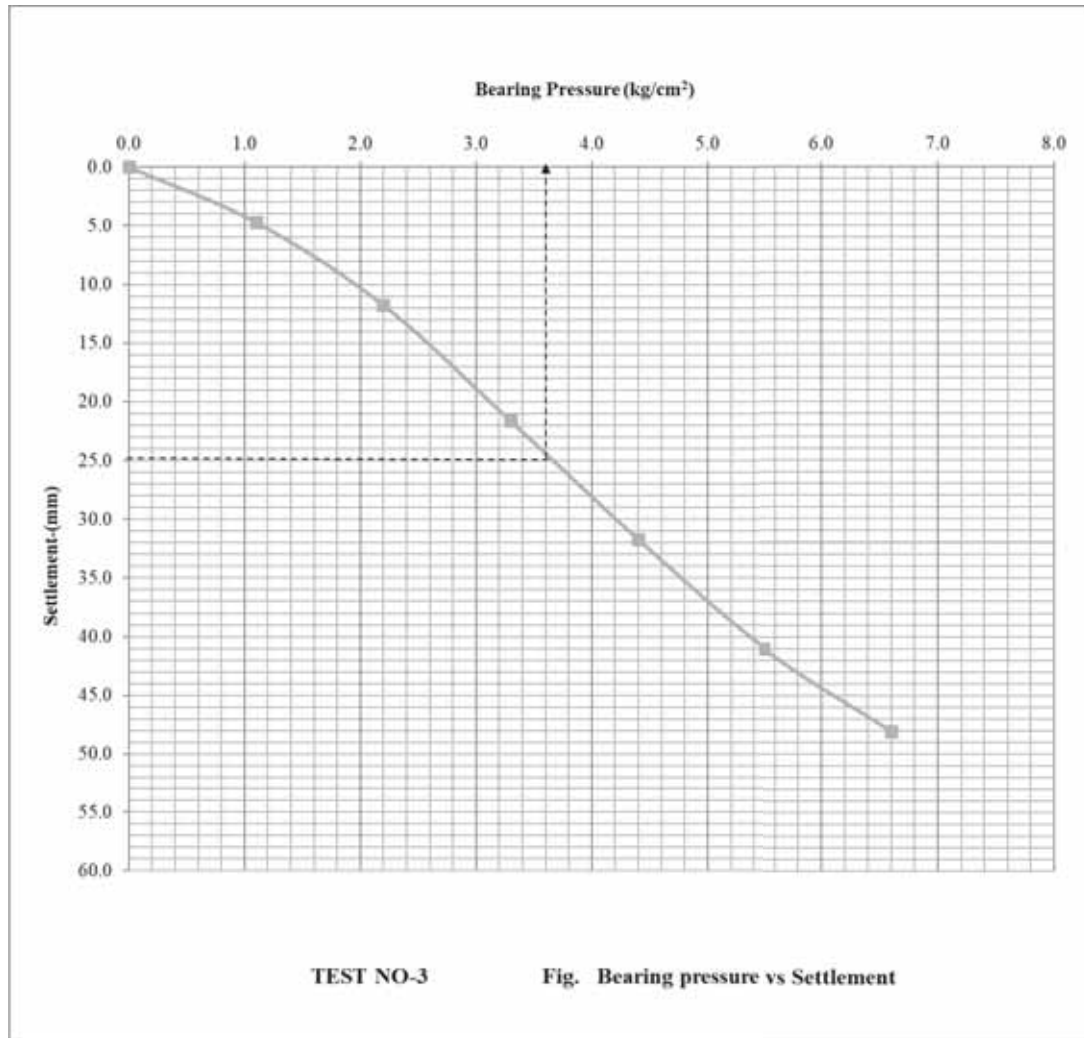
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.6 kg/cm².

Net safe bearing capacity = 35.43 t/m²

Test No 4

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.140	6.47
2.20	4.523	13.67
3.30	6.651	20.11
4.40	9.361	28.31
5.50	12.630	38.20
6.60	14.250	43.10

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

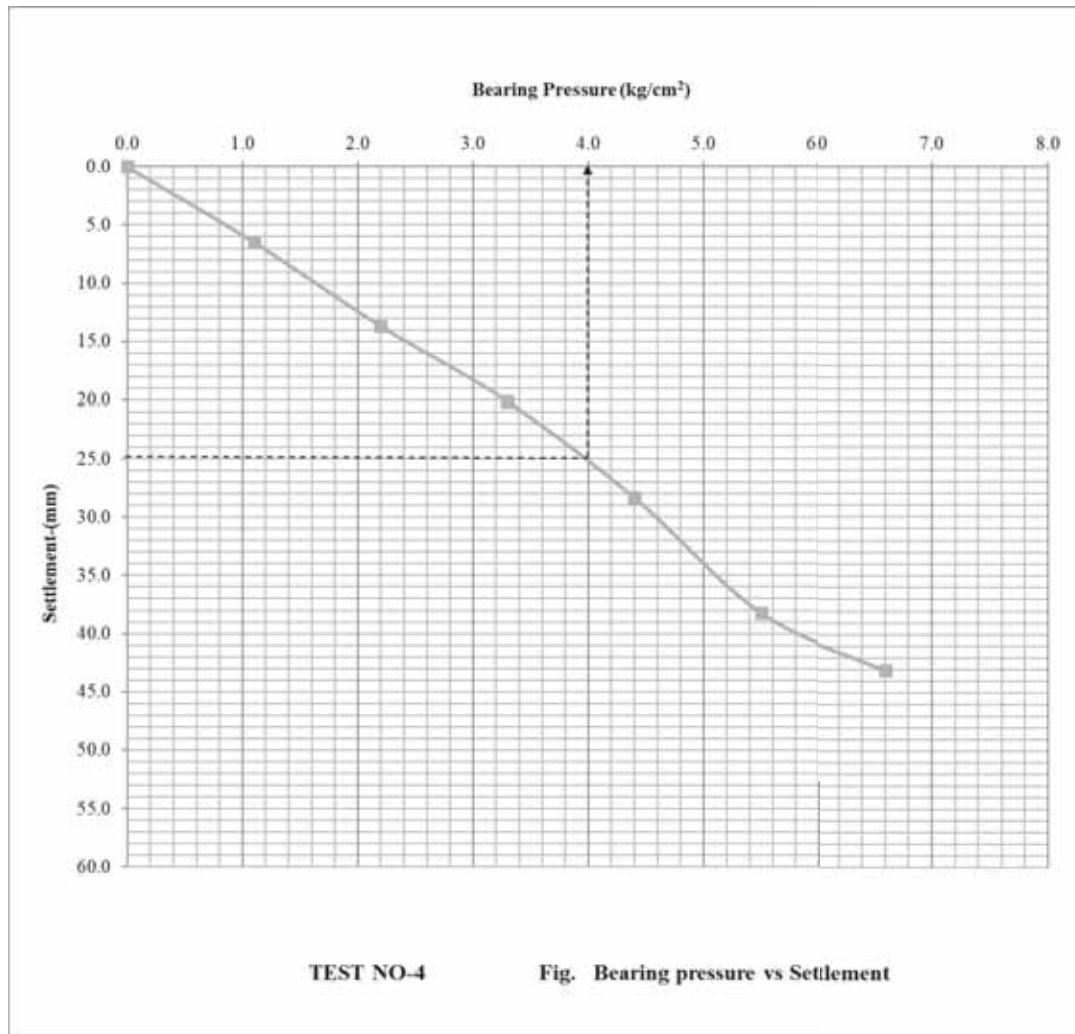
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 4.0 kg/cm².

Net safe bearing capacity = 39.36 t/m²

Test No 5

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	1.664	5.03
2.20	3.891	11.76
3.30	5.891	17.81
4.40	9.840	29.76
5.50	12.361	37.38
6.60	15.123	45.73

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

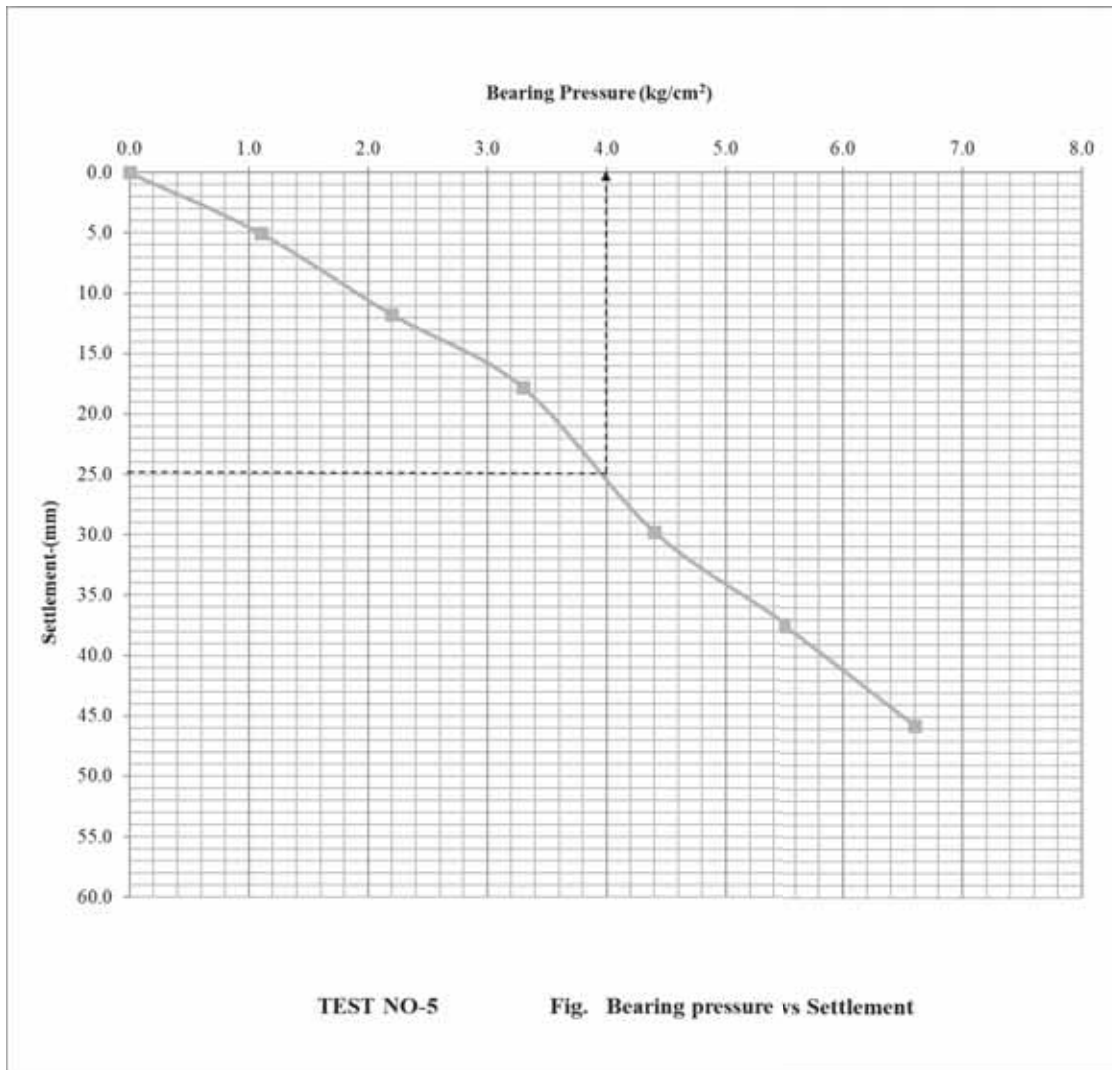
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 4.0 kg/cm².

Net safe bearing capacity = 39.36 t/m²

Test No 6

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.154	6.51
2.20	5.146	15.56
3.30	8.541	25.83
4.40	10.361	31.33
5.50	13.361	40.40
6.60	15.441	46.70

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

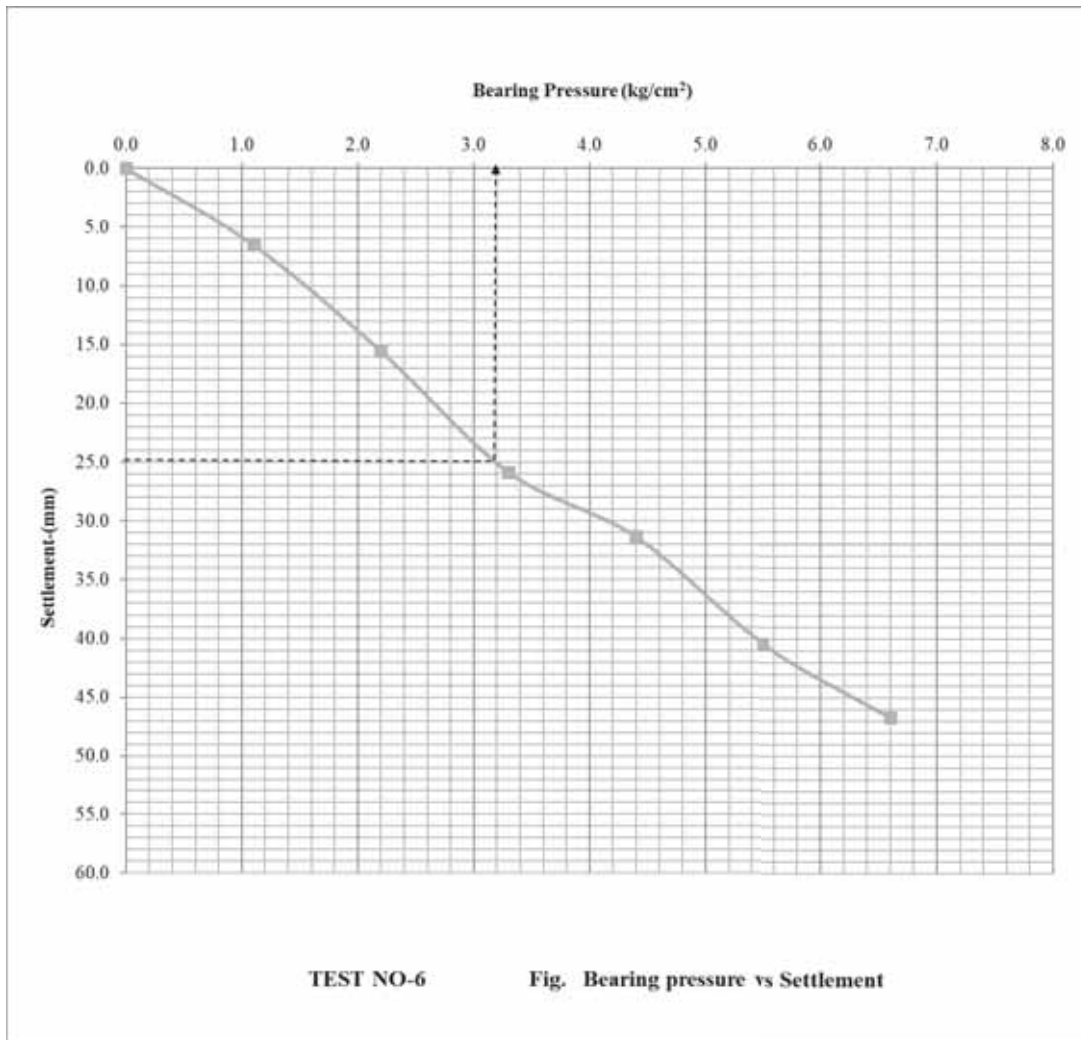
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.2 kg/cm².

Net safe bearing capacity = 31.49 t/m²

Test No 7

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	1.584	4.79
2.20	3.614	10.93
3.30	6.871	20.78
4.40	11.140	33.69
5.50	14.251	43.10
6.60	16.210	49.02

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

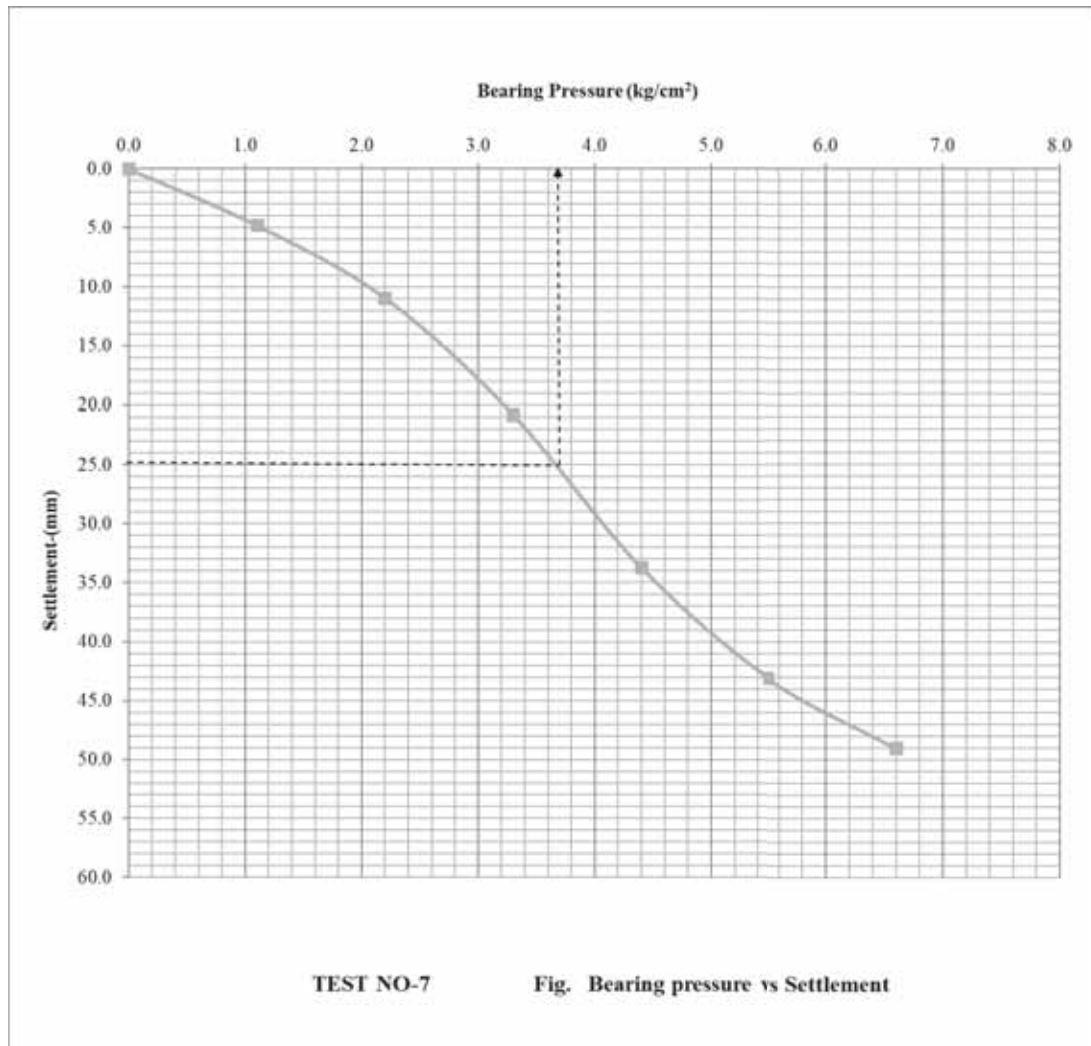
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.7 kg/cm².

Net safe bearing capacity = 36.41 t/m²

Test No 8

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	1.891	5.71
2.20	3.541	10.71
3.30	7.451	22.53
4.40	10.251	31.00
5.50	13.520	40.89
6.60	15.120	45.73

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

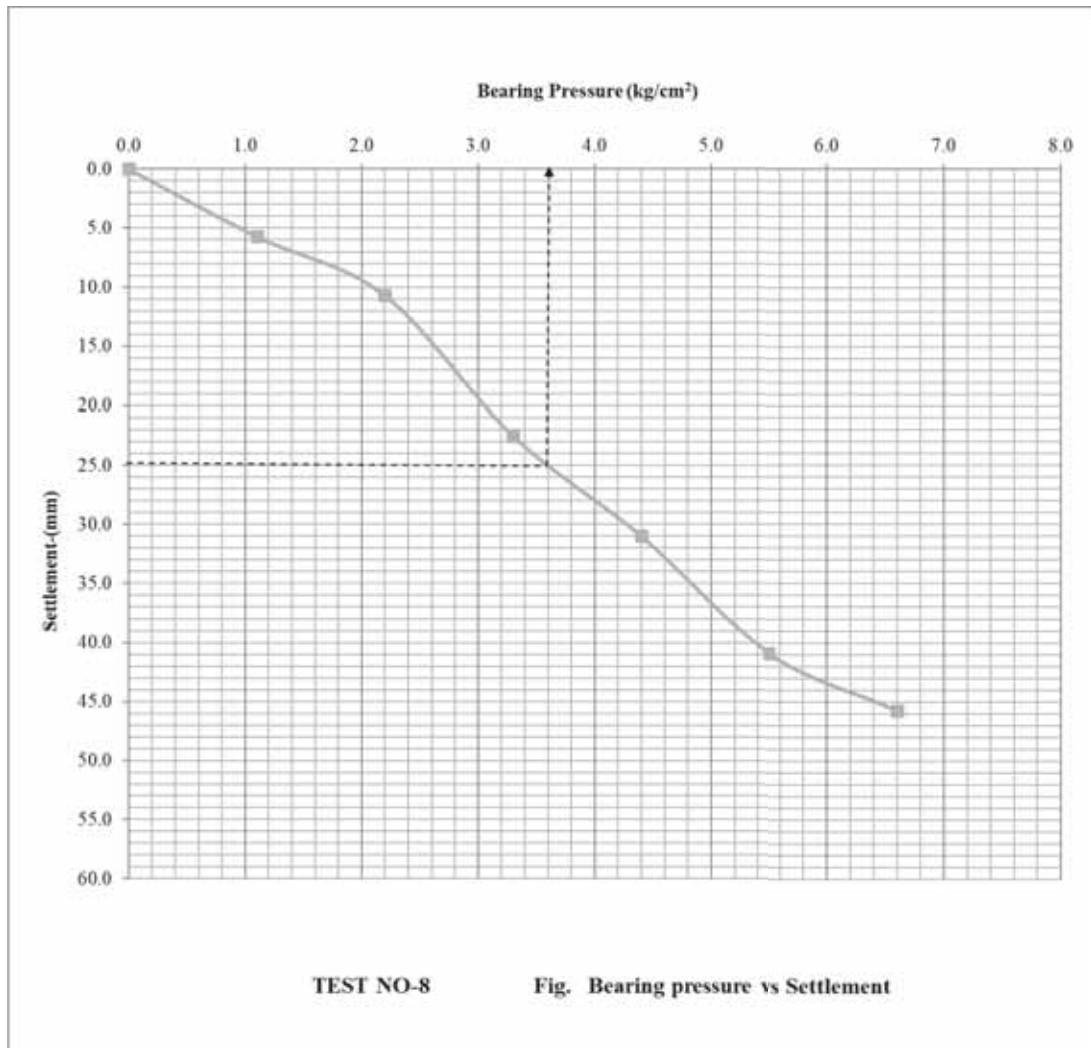
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.6 kg/cm².

Net safe bearing capacity = 35.43 t/m²

Test No 9

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.145	6.48
2.20	4.631	14.00
3.30	8.261	24.98
4.40	11.240	34.00
5.50	14.321	43.32
6.60	16.810	50.84

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

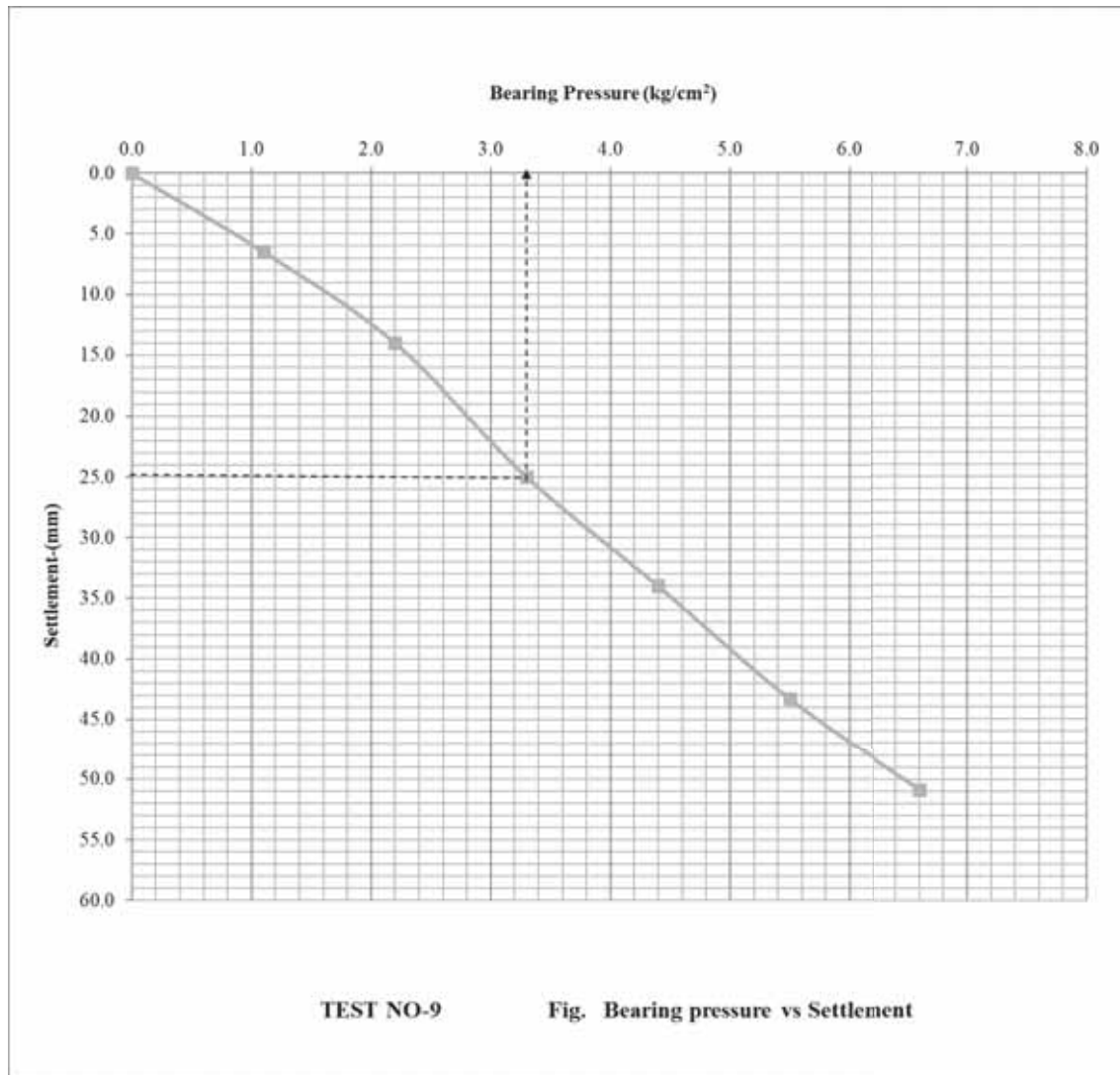
$$S_f = S_p \left[\frac{B(b_p + 0.3)}{b_p(B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.3 kg/cm².

Net safe bearing capacity = 32.47 t/m²

Test No 10

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.361	7.14
2.20	5.321	16.10
3.30	7.651	23.14
4.40	10.360	31.33
5.50	13.365	40.40
6.60	15.420	46.63

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

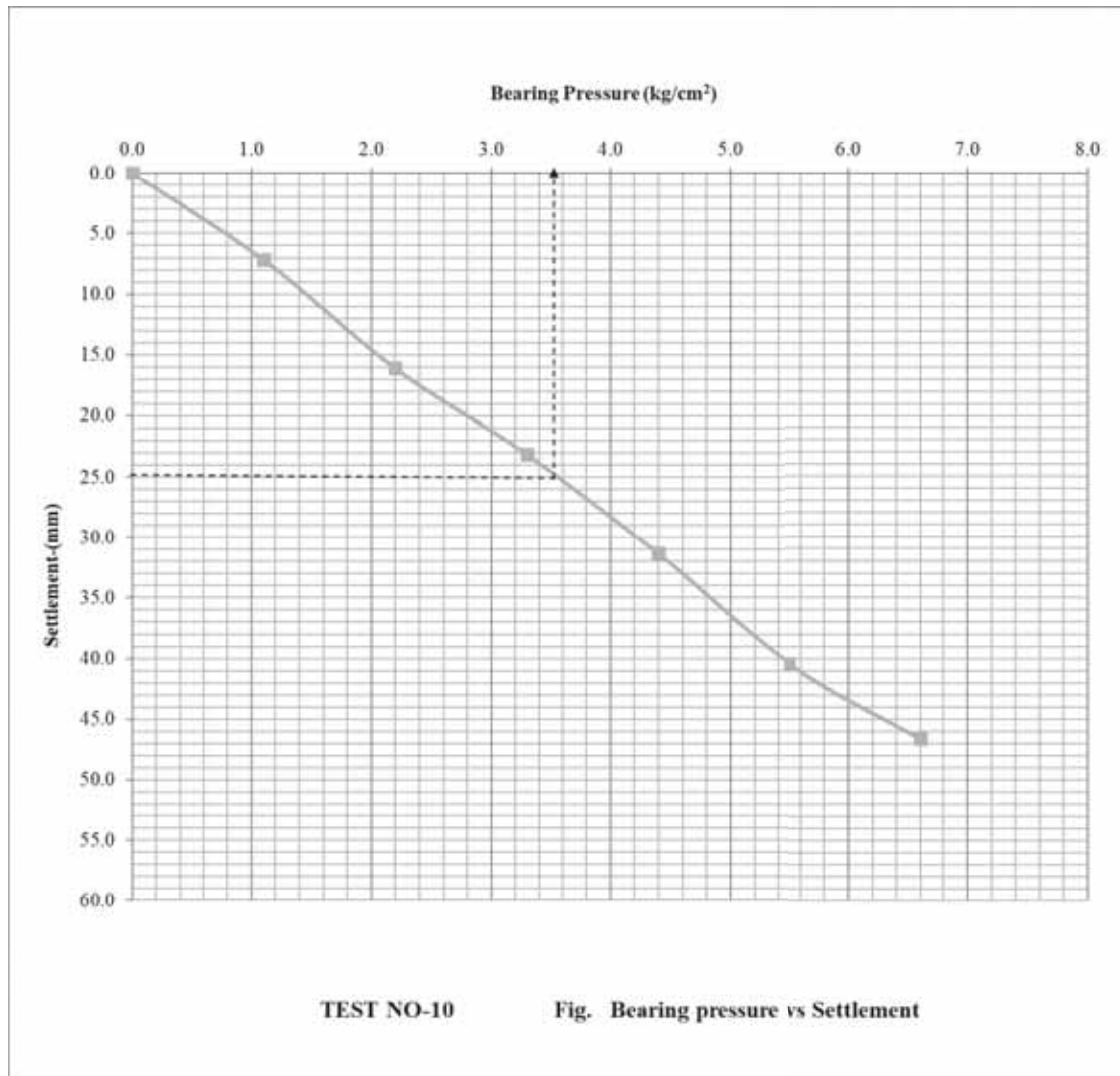
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.5 kg/cm².

Net safe bearing capacity = 34.44 t/m²

Test No 11

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	1.980	6.00
2.20	4.250	12.85
3.30	7.410	22.41
4.40	10.320	31.21
5.50	13.520	40.89
6.60	16.140	48.81

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

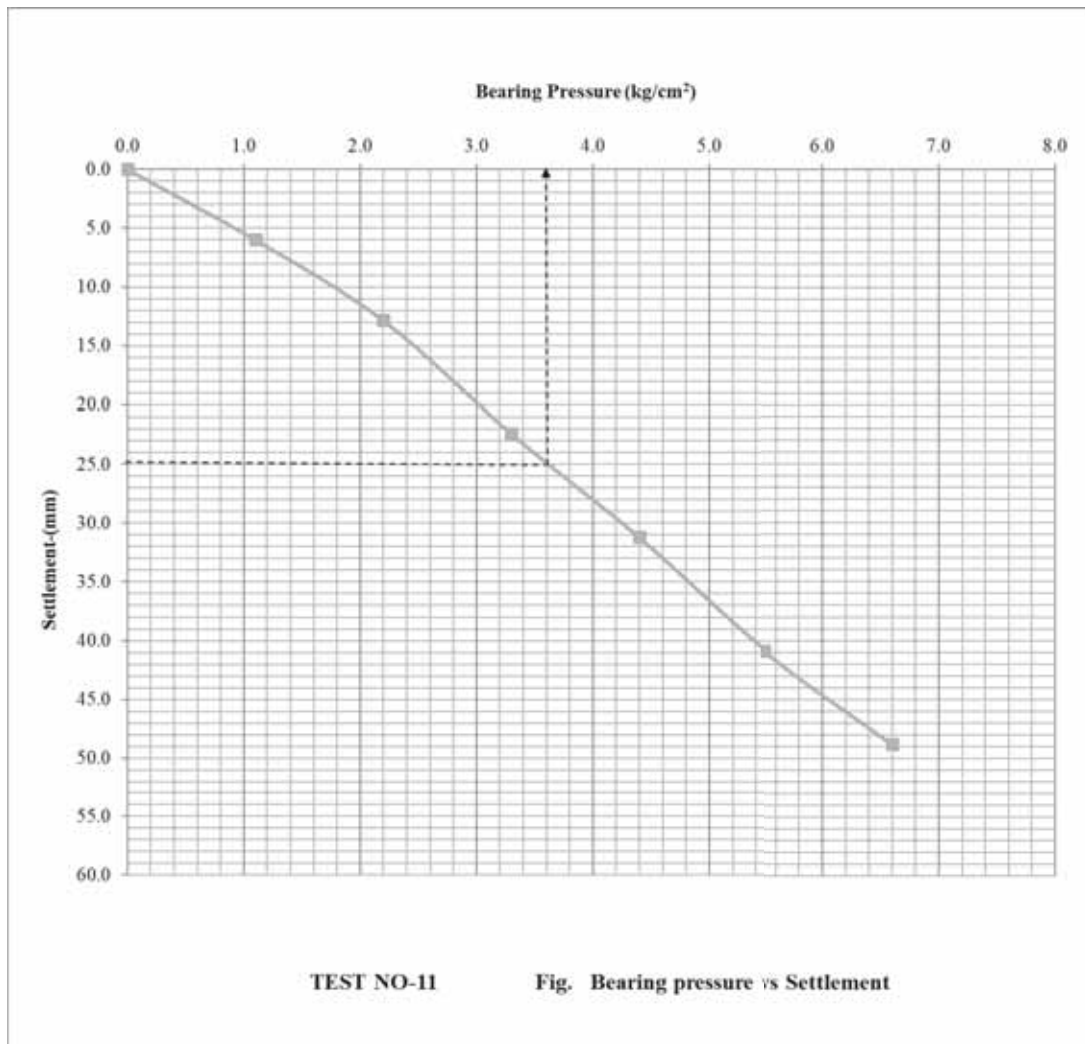
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.6 kg/cm².

Net safe bearing capacity = 35.43 t/m²

Test No 12

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.140	6.47
2.20	4.560	13.80
3.30	8.250	24.96
4.40	12.361	37.38
5.50	14.510	43.88
6.60	16.500	49.90

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

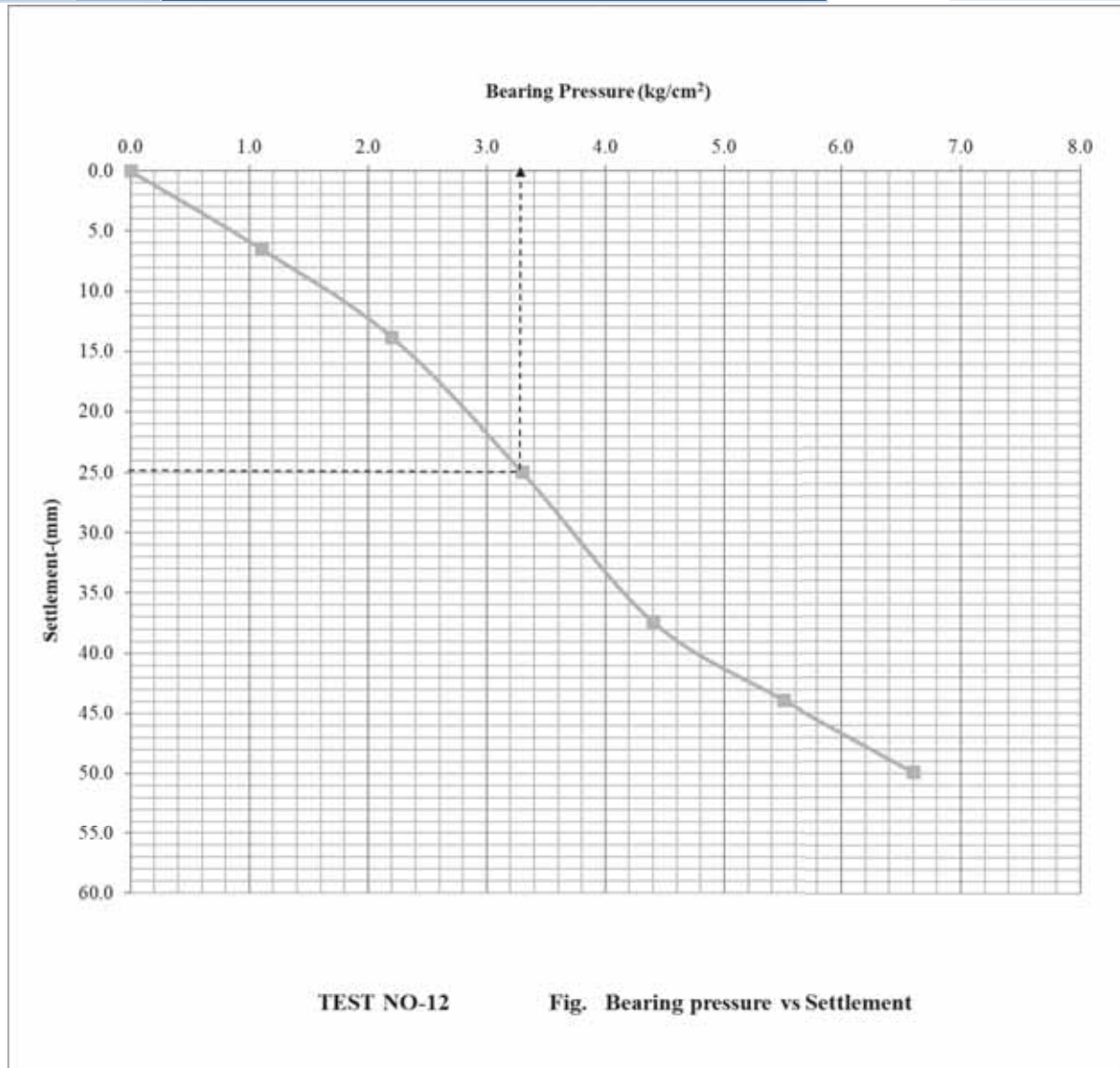
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f: Permissible settlement value for foundation

S_p: Settlement observed for plate size

B_f: Width of foundation

B_p: Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.3 kg/cm².

Net safe bearing capacity = 32.47 t/m²

Test No 13

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.360	7.13
2.20	4.890	14.79
3.30	9.631	29.12
4.40	13.140	39.74
5.50	15.200	45.97
6.60	16.470	49.81

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

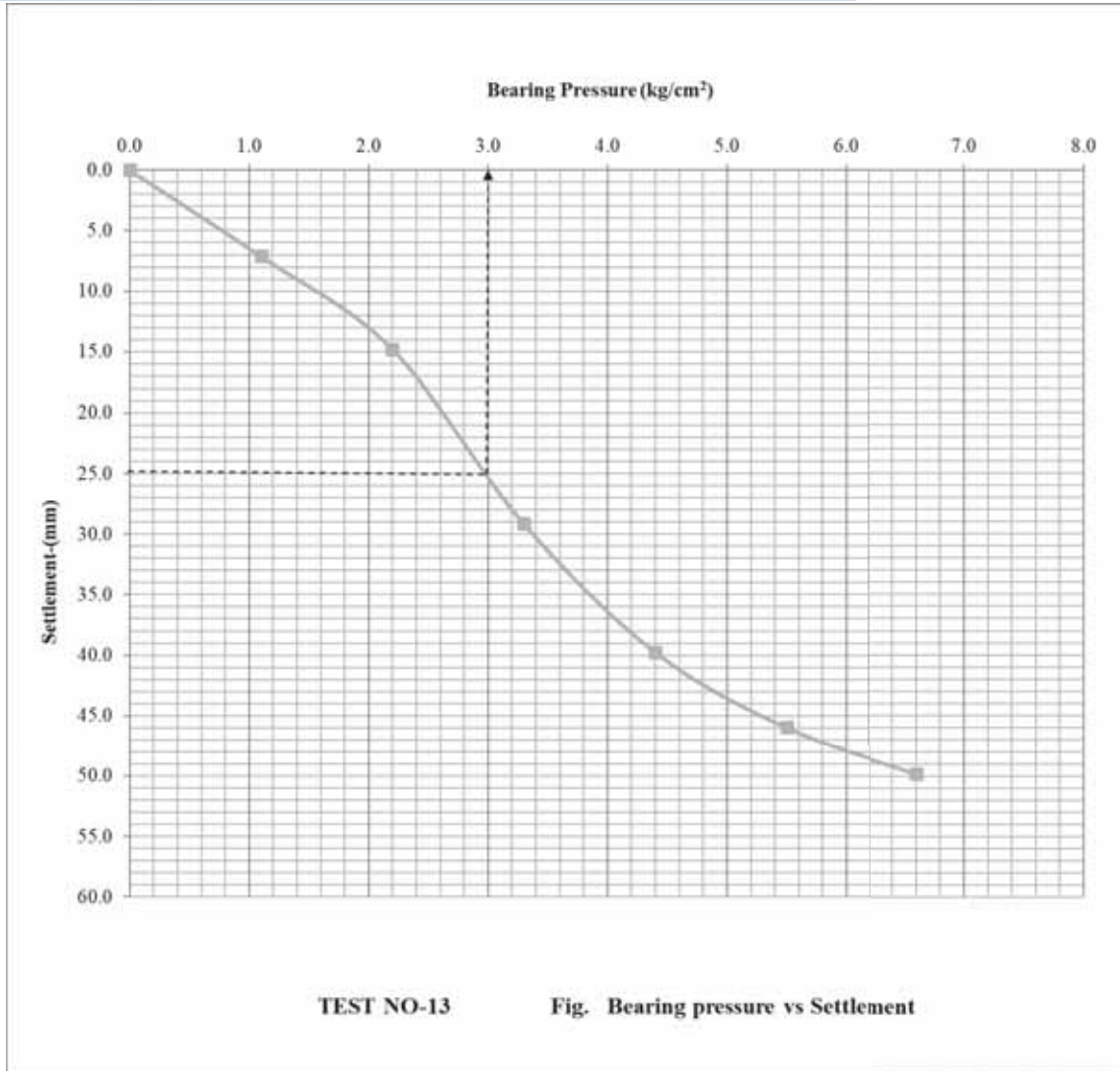
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.0 kg/cm^2 .

Net safe bearing capacity = 29.52 t/m^2

Test No 14

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.140	6.47
2.20	4.310	13.03
3.30	8.450	25.55
4.40	11.120	33.63
5.50	13.220	39.98
6.60	15.110	45.70

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

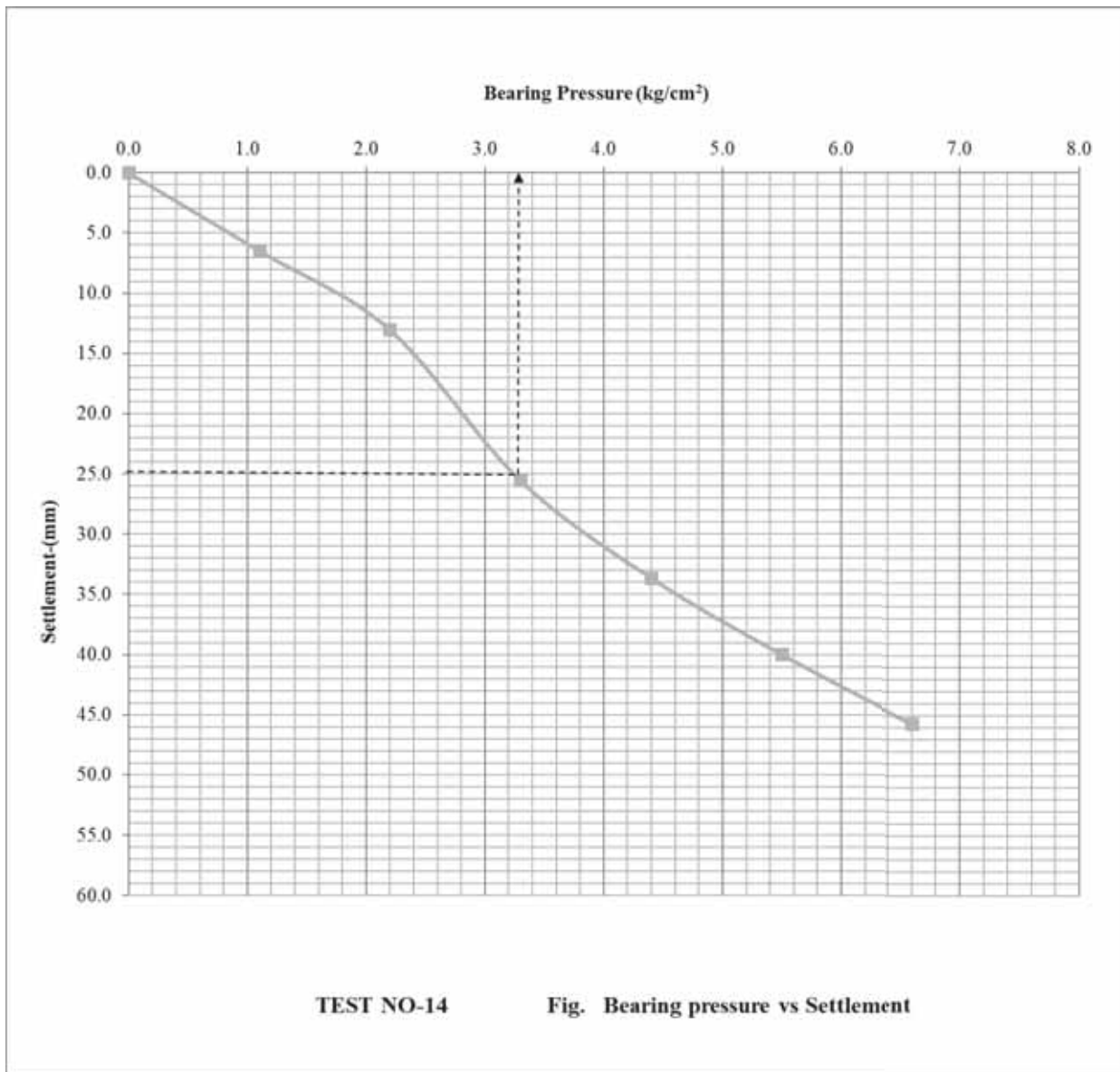
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.3 kg/cm².

Net safe bearing capacity = 32.47 t/m²

Test No 15

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	1.850	5.60
2.20	3.250	9.82
3.30	6.220	18.81
4.40	9.540	28.85
5.50	11.310	34.20
6.60	13.450	40.68

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

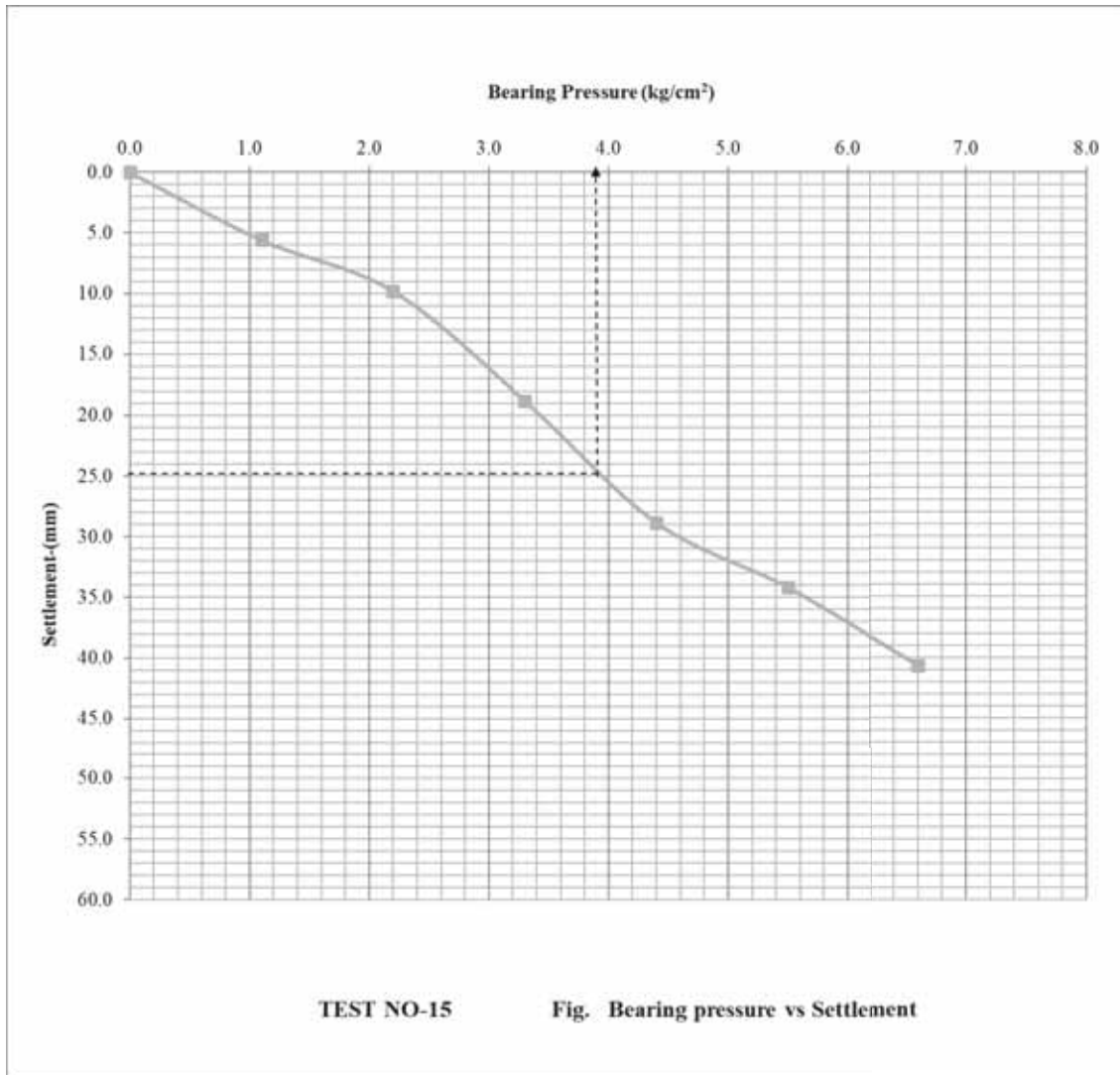
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.9 kg/cm².

Net safe bearing capacity = 38.38 t/m²

Test No 16

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.150	6.50
2.20	4.300	13.00
3.30	7.450	22.53
4.40	9.810	29.67
5.50	13.450	40.68
6.60	16.200	48.99

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

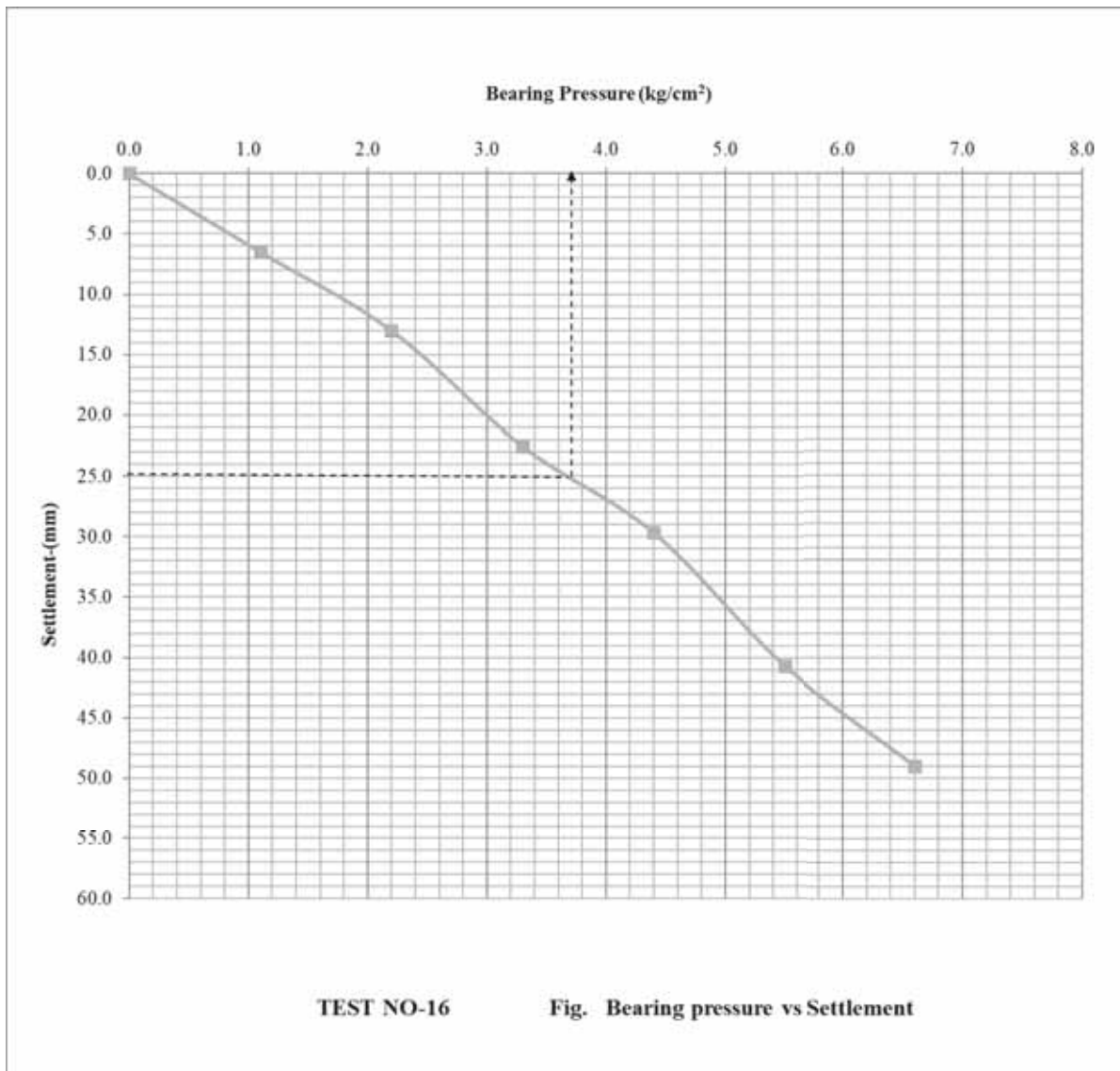
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.7 kg/cm².

Net safe bearing capacity = 36.41 t/m²

Test No 17

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	1.689	5.10
2.20	3.561	10.77
3.30	6.540	19.78
4.40	8.600	26.01
5.50	11.300	34.17
6.60	13.140	39.74

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

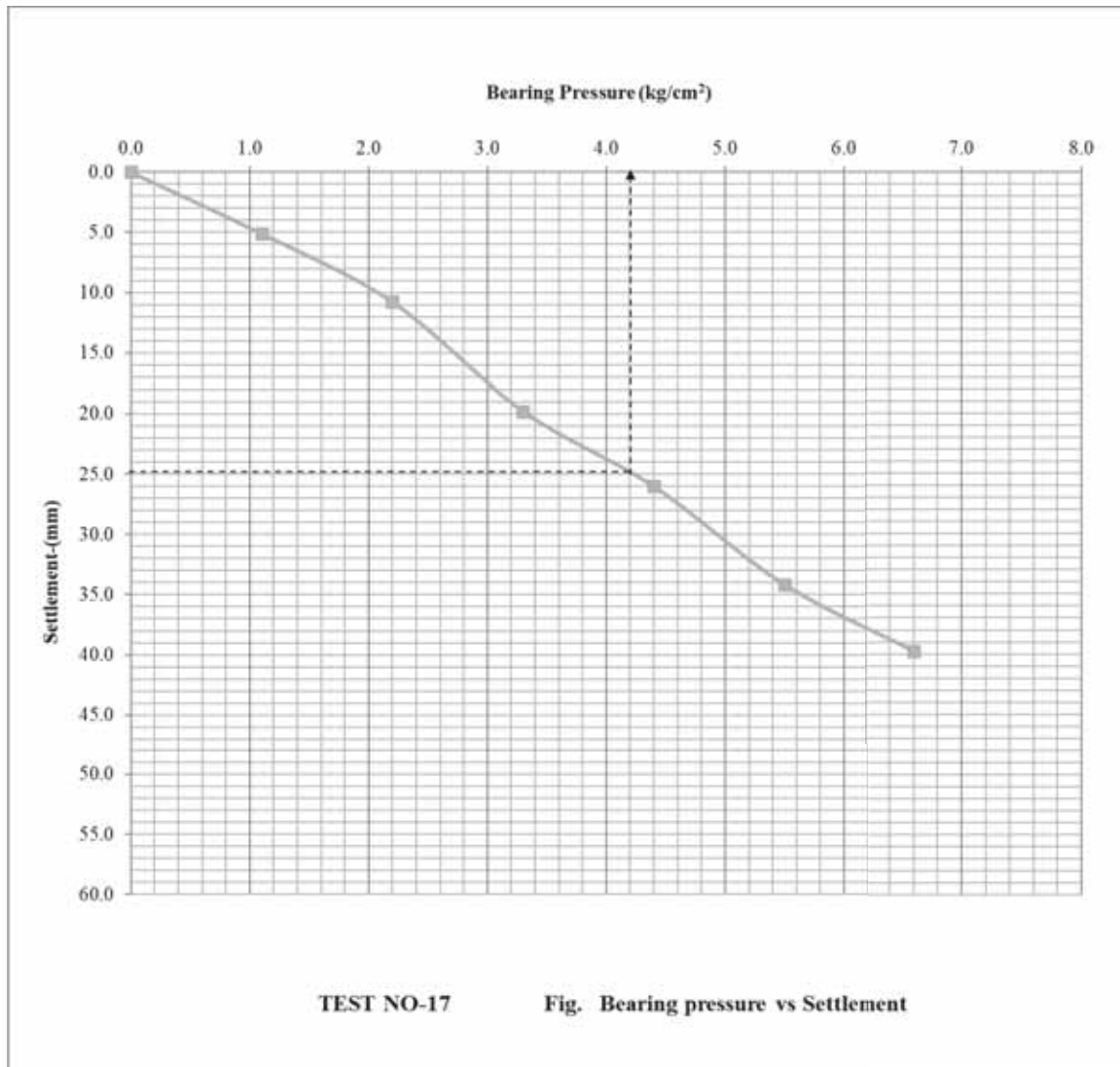
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 4.2 kg/cm².

Net safe bearing capacity = 41.33 t/m²

Test No 18

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.110	6.38
2.20	4.320	13.10
3.30	6.890	20.84
4.40	10.300	31.15
5.50	12.145	36.73
6.60	14.520	43.91

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

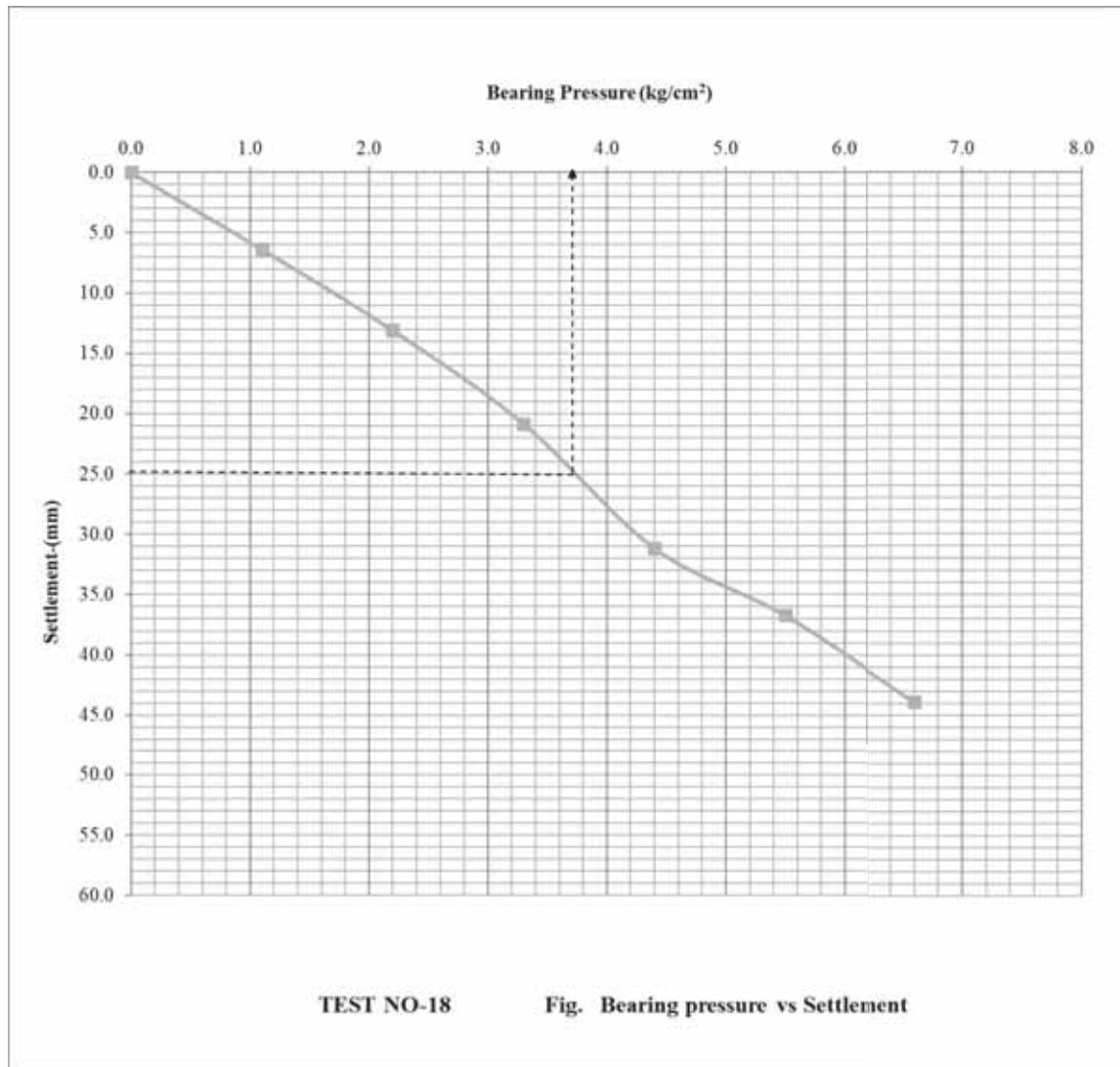
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f: Permissible settlement value for foundation

S_p: Settlement observed for plate size

B_f: Width of foundation

B_p: Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.7 kg/cm².

Net safe bearing capacity = 36.41 t/m²

Test No 19

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	2.340	7.07
2.20	4.800	14.51
3.30	7.360	22.26
4.40	10.310	31.18
5.50	14.300	43.25
6.60	16.500	49.90

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

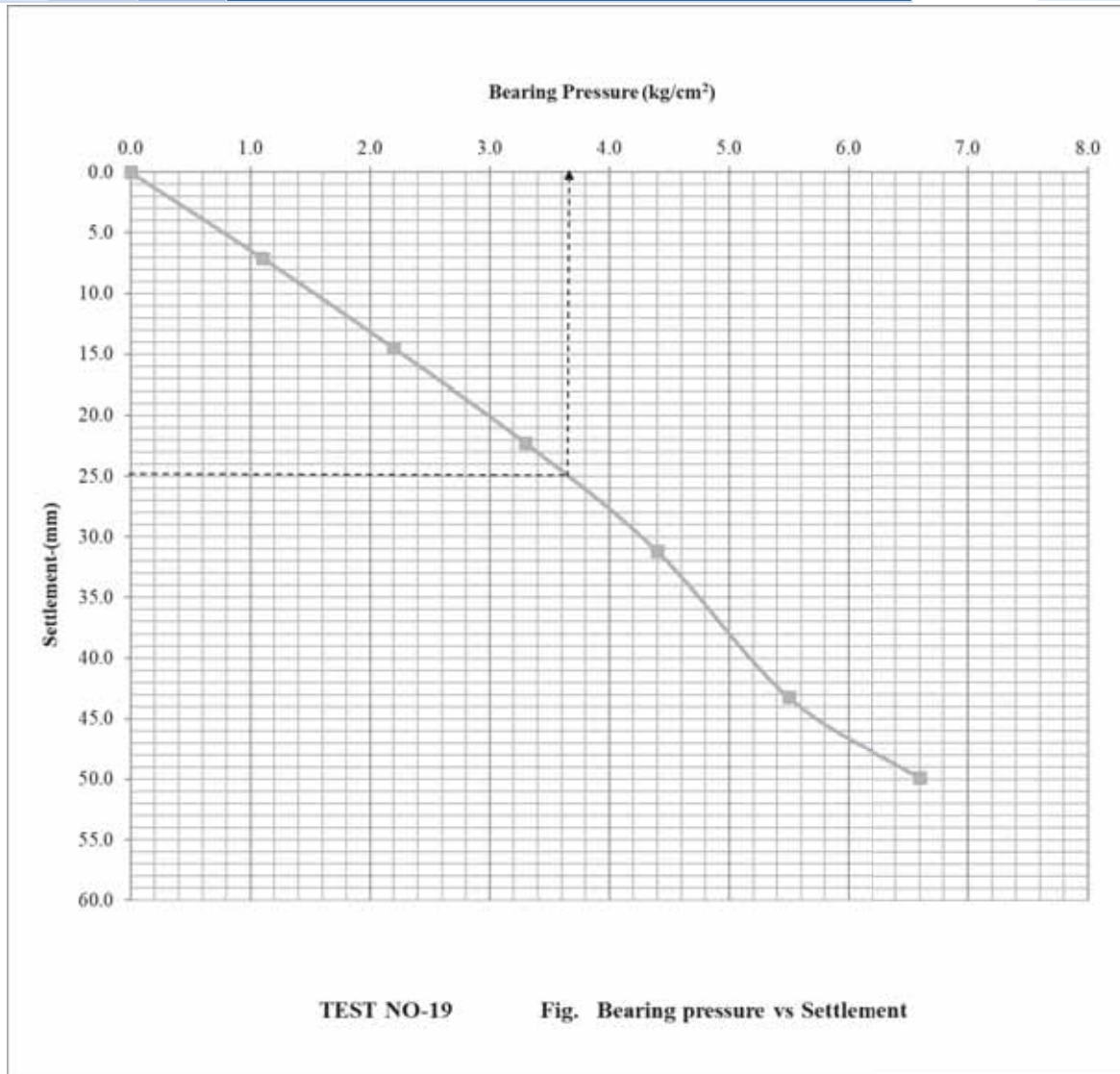
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f : Permissible settlement value for foundation

S_p : Settlement observed for plate size

B_f : Width of foundation

B_p : Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

Hence, for 25mm settlement of foundation the safe bearing capacity is 3.65 kg/cm².

Net safe bearing capacity = 35.92 t/m²

Test No 20

Pressure (Kg/Cm ²)	Settlement of plate (mm)	Settlement of foundation (mm)
1.10	3.140	9.49
2.20	5.360	16.21
3.30	8.310	25.13
4.40	11.360	34.35
5.50	15.140	45.79
6.60	17.300	52.32

The extrapolation of bearing capacity value is carried out as per IS: 1888-1982 & IS 8009 (Part -1) -1976:

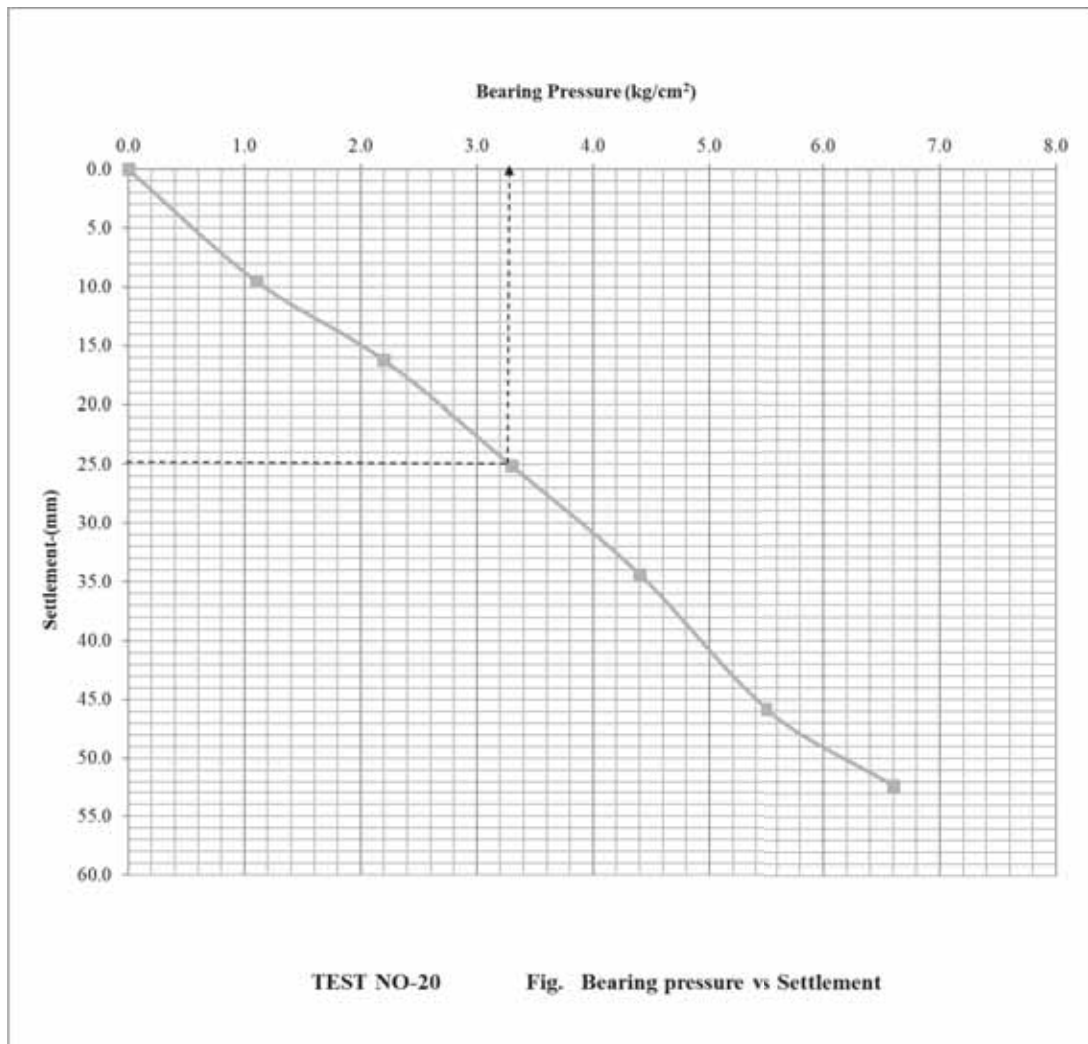
$$S_f = S_p \left[\frac{B (b_p + 0.3)}{b_p (B + 0.3)} \right]^2$$

S_f: Permissible settlement value for foundation

S_p: Settlement observed for plate size

B_f: Width of foundation

B_p: Size of plate



The safe Bearing capacity is calculated based on Load Vs Settlement of the Plate Load Tests.

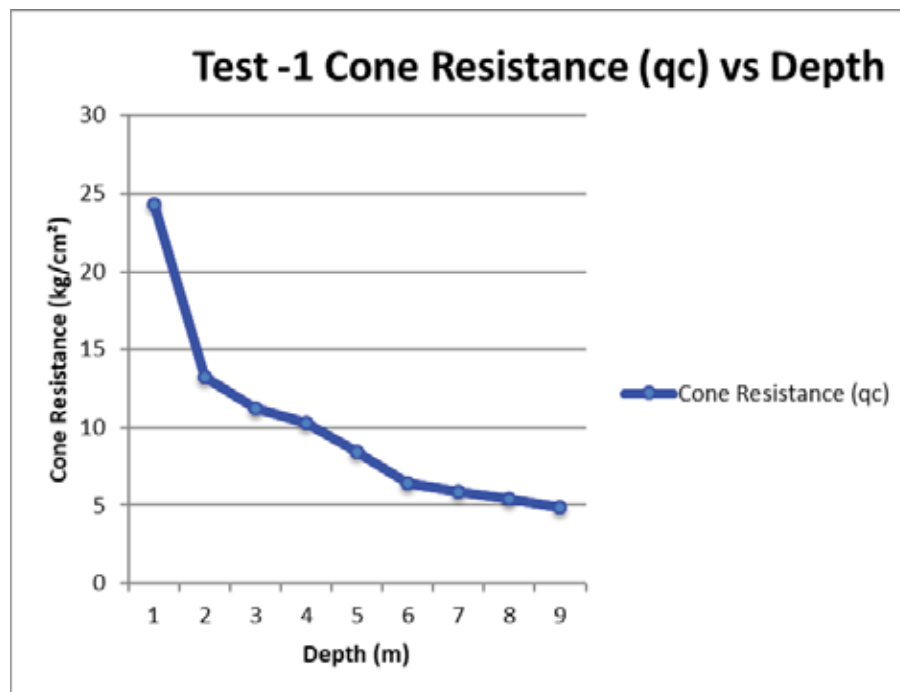
Hence, for 25mm settlement of foundation the safe bearing capacity is 3.3 kg/cm².

Net safe bearing capacity = 32.47 t/m²

STATIC CONE PENETRATION TEST

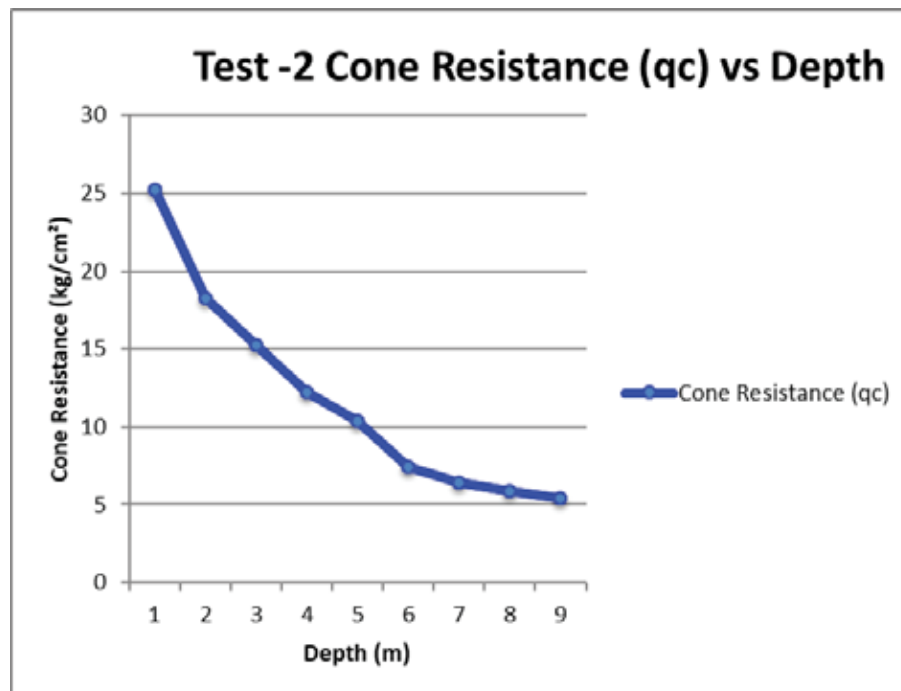
Test No.1

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	24.0	0.26	24.26
0.40	13.0	0.26	13.26
0.60	11.0	0.26	11.26
0.80	10.0	0.26	10.26
1.00	8.0	0.41	8.41
1.20	6.0	0.41	6.41
1.40	5.5	0.41	5.91
1.60	5.0	0.41	5.41
1.80	4.5	0.41	4.91



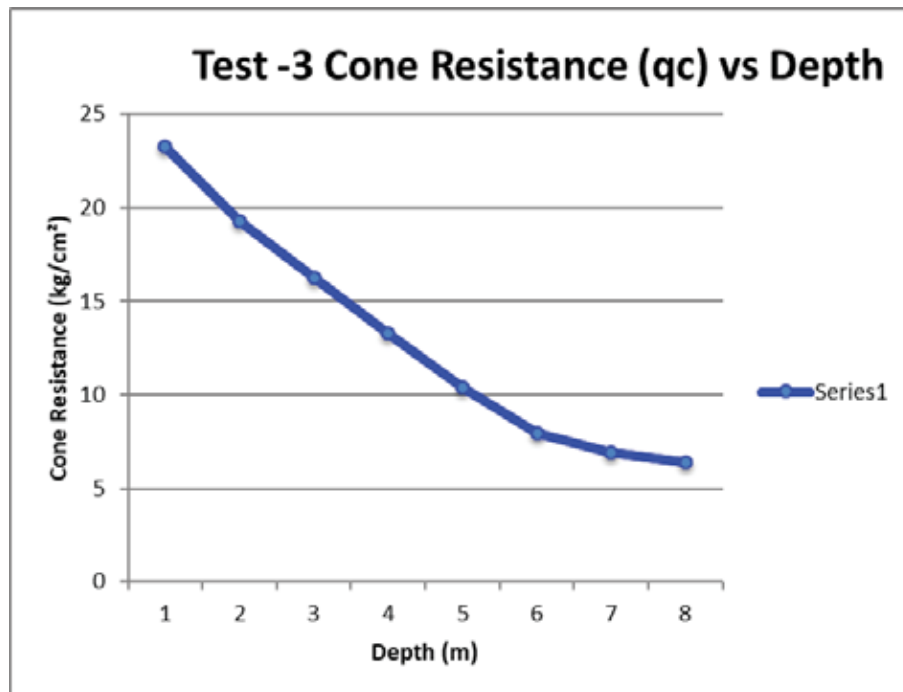
Test No.2

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	25.0	0.26	25.26
0.40	18.0	0.26	18.26
0.60	15.0	0.26	15.26
0.80	12.0	0.26	12.26
1.00	10.0	0.41	10.41
1.20	7.0	0.41	7.41
1.40	6.0	0.41	6.41
1.60	5.5	0.41	5.91
1.80	5.0	0.41	5.41



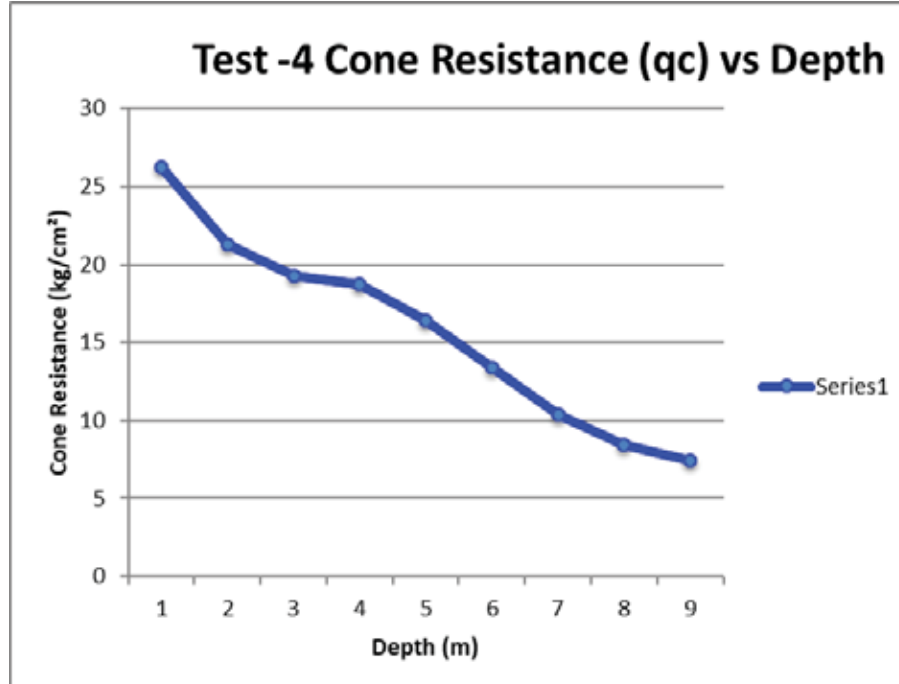
Test No.3

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (q _c) (kg/cm ²)
0.20	23.0	0.26	23.26
0.40	19.0	0.26	19.26
0.60	16.0	0.26	16.26
0.80	13.0	0.26	13.26
1.00	10.0	0.41	10.41
1.20	7.5	0.41	7.91
1.40	6.5	0.41	6.91
1.60	6.0	0.41	6.41



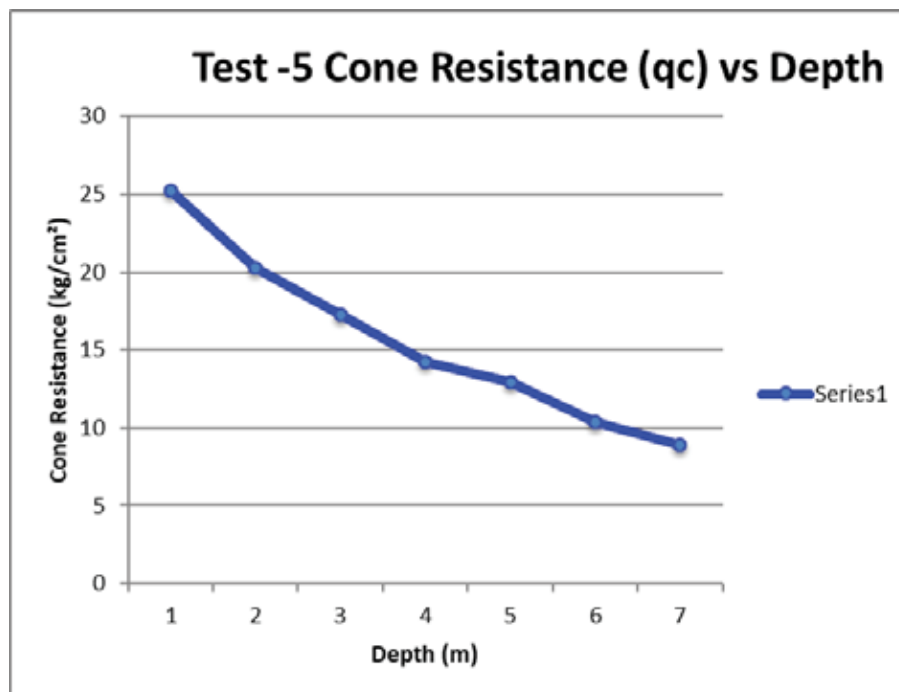
Test No.4

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	26.0	0.26	26.26
0.40	21.0	0.26	21.26
0.60	19.0	0.26	19.26
0.80	18.5	0.26	18.76
1.00	16.0	0.41	16.41
1.20	13.0	0.41	13.41
1.40	10.0	0.41	10.41
1.60	8.0	0.41	8.41
1.80	7.0	0.41	7.41



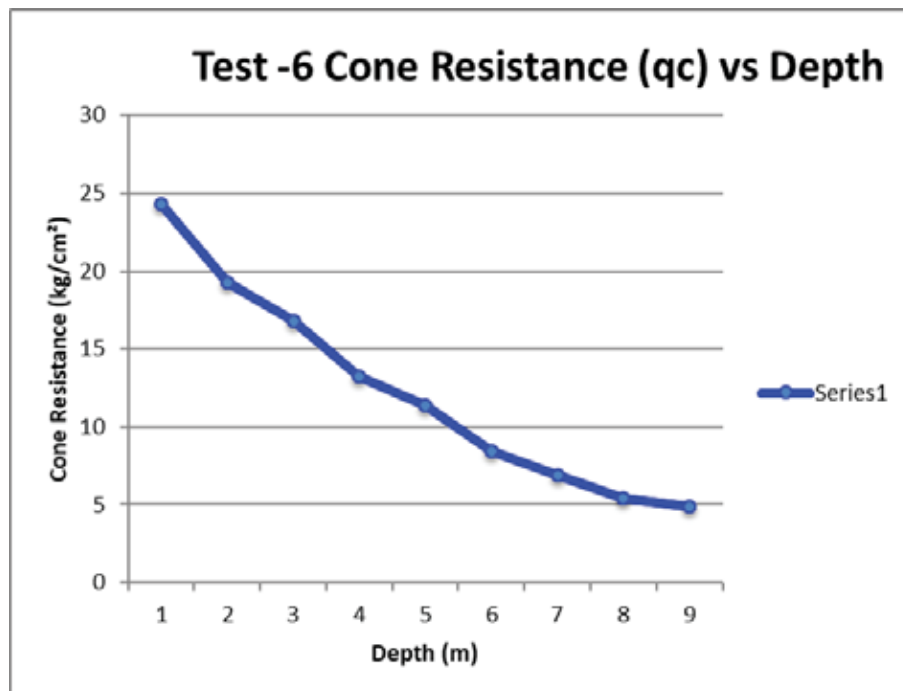
Test No.5

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	25.0	0.26	25.26
0.40	20.0	0.26	20.26
0.60	17.0	0.26	17.26
0.80	14.0	0.26	14.26
1.00	12.5	0.41	12.91
1.20	10.0	0.41	10.41
1.40	8.5	0.41	8.91
1.60	8.0	0.41	8.41



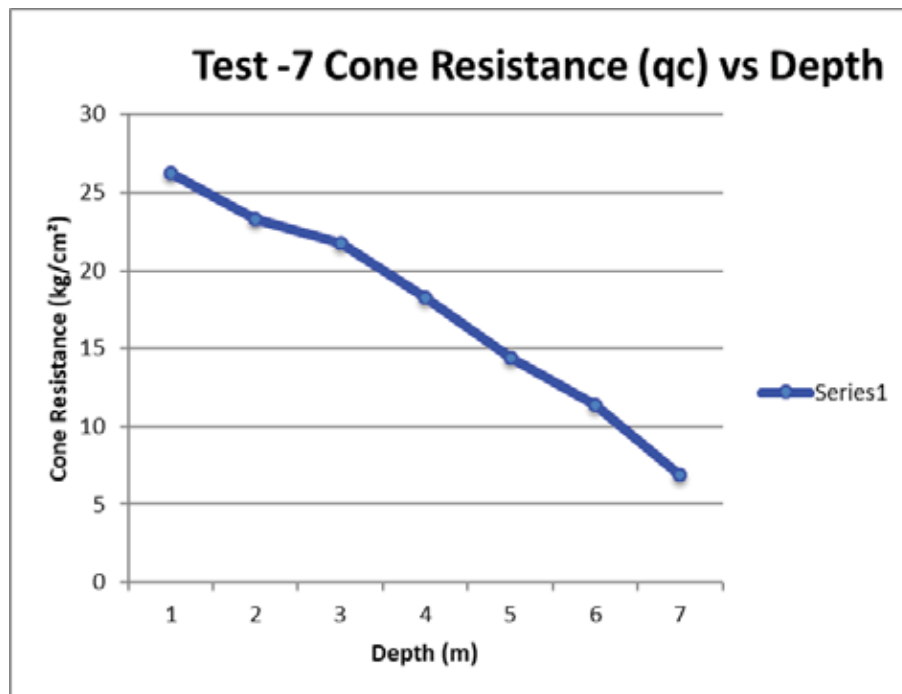
Test No.6

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	24.0	0.26	24.26
0.40	19.0	0.26	19.26
0.60	16.5	0.26	16.76
0.80	13.0	0.26	13.26
1.00	11.0	0.41	11.41
1.20	8.0	0.41	8.41
1.40	6.5	0.41	6.91
1.60	5.0	0.41	5.41
1.80	4.5	0.41	4.91



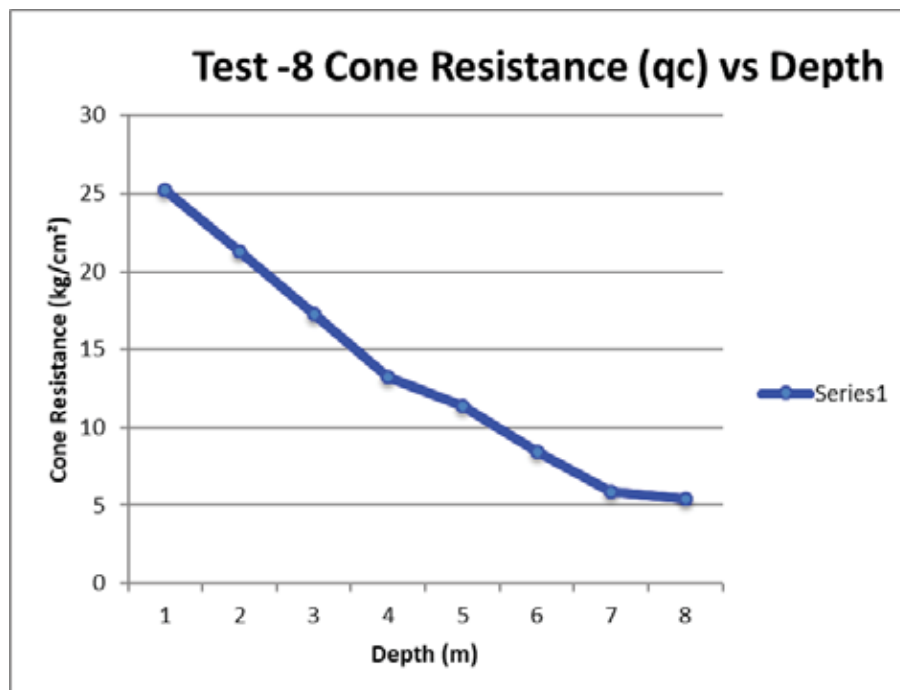
Test No.7

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	26.0	0.26	26.26
0.40	23.0	0.26	23.26
0.60	21.5	0.26	21.76
0.80	18.0	0.26	18.26
1.00	14.0	0.41	14.41
1.20	11.0	0.41	11.41
1.40	6.5	0.41	6.91



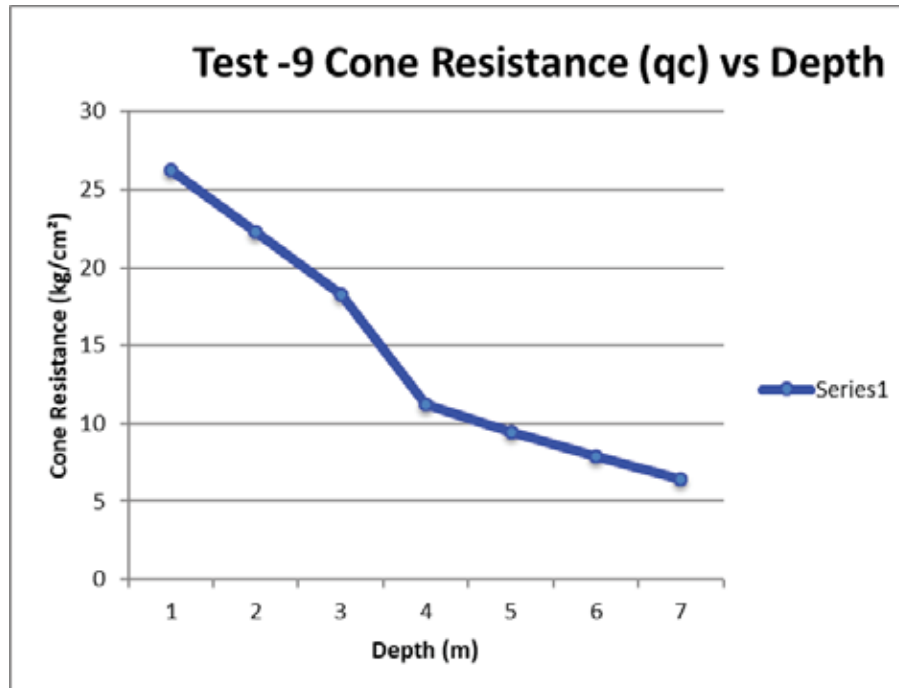
Test No.8

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	25.0	0.26	25.26
0.40	21.0	0.26	21.26
0.60	17.0	0.26	17.26
0.80	13.0	0.26	13.26
1.00	11.0	0.41	11.41
1.20	8.0	0.41	8.41
1.40	5.5	0.41	5.91
1.60	5.0	0.41	5.41



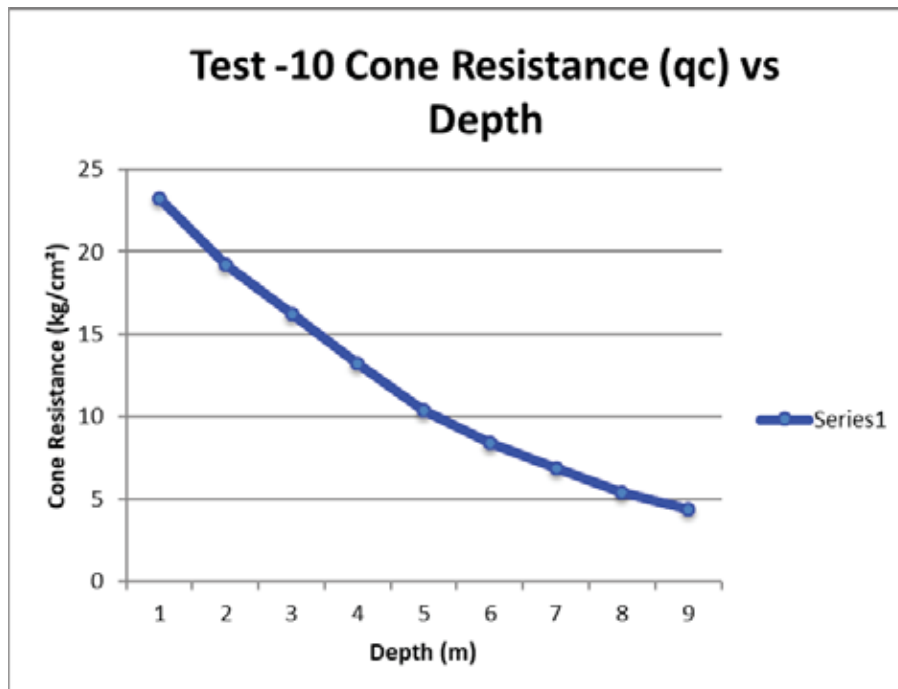
Test No.9

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	26.0	0.26	26.26
0.40	22.0	0.26	22.26
0.60	18.0	0.26	18.26
0.80	11.0	0.26	11.26
1.00	9.0	0.41	9.41
1.20	7.5	0.41	7.91
1.40	6.0	0.41	6.41



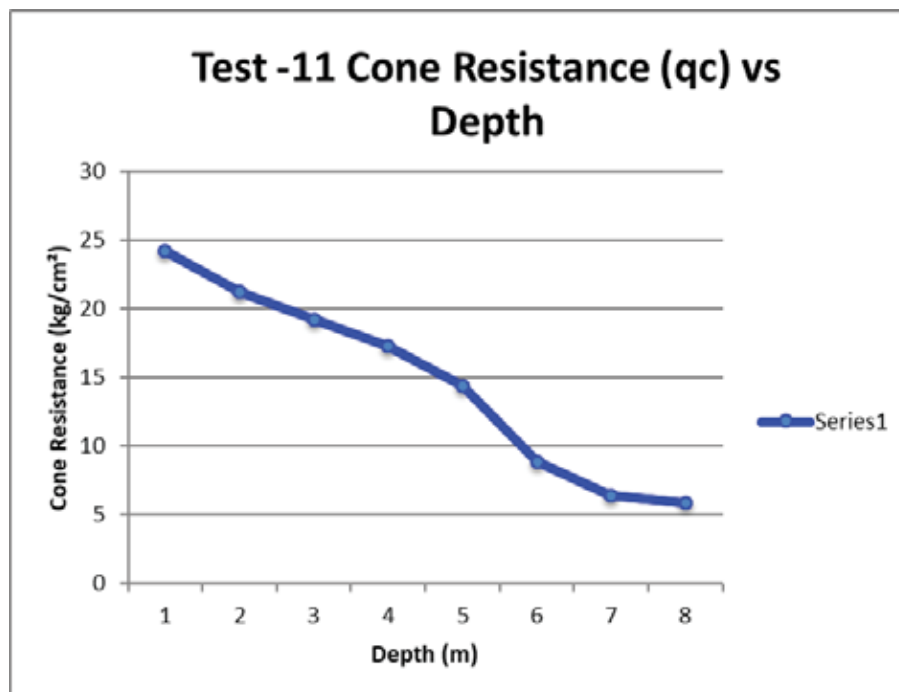
Test No.10

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	23.0	0.26	23.26
0.40	19.0	0.26	19.26
0.60	16.0	0.26	16.26
0.80	13.0	0.26	13.26
1.00	10.0	0.41	10.41
1.20	8.0	0.41	8.41
1.40	6.5	0.41	6.91
1.60	5.0	0.41	5.41
1.80	4.0	0.41	4.41



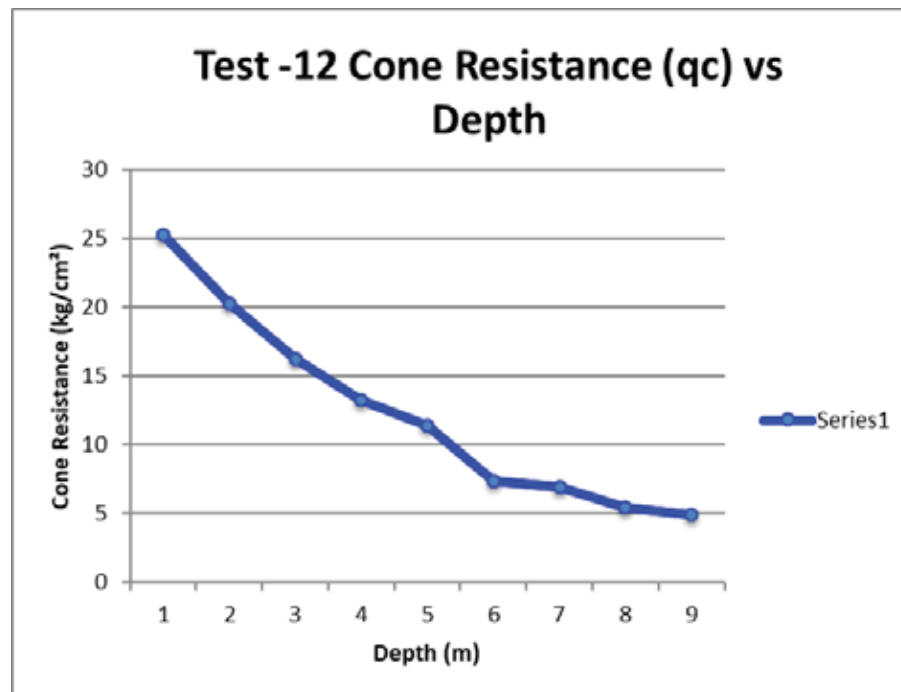
Test No.11

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	24.0	0.26	24.26
0.40	21.0	0.26	21.26
0.60	19.0	0.26	19.26
0.80	17.0	0.26	17.26
1.00	14.0	0.41	14.41
1.20	8.5	0.41	8.91
1.40	6.0	0.41	6.41
1.60	5.5	0.41	5.91



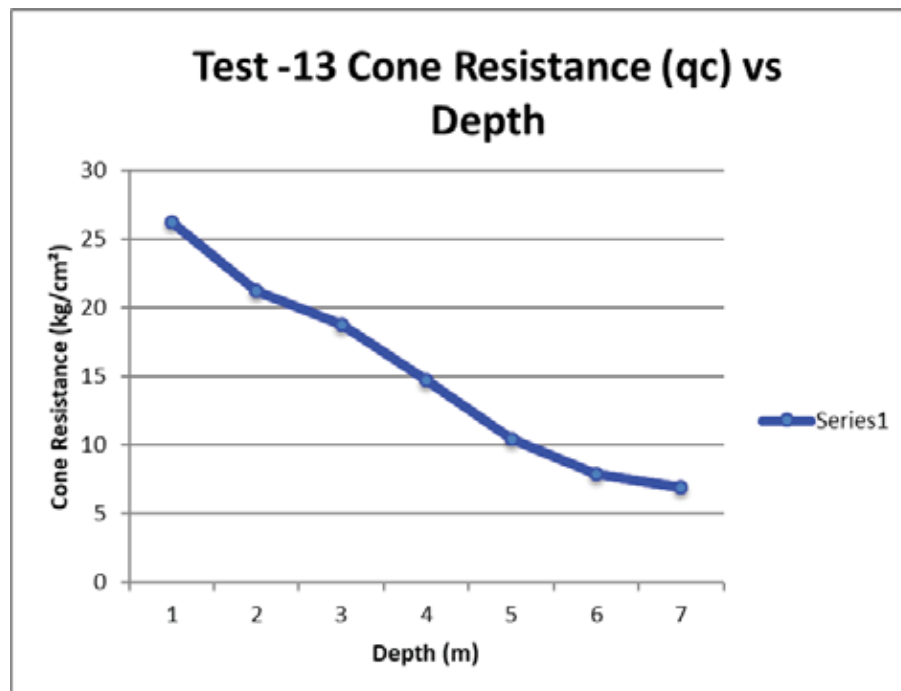
Test No.12

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	25.0	0.26	25.26
0.40	20.0	0.26	20.26
0.60	16.0	0.26	16.26
0.80	13.0	0.26	13.26
1.00	11.0	0.41	11.41
1.20	7.0	0.41	7.41
1.40	6.5	0.41	6.91
1.60	5.0	0.41	5.41
1.80	4.5	0.41	4.91



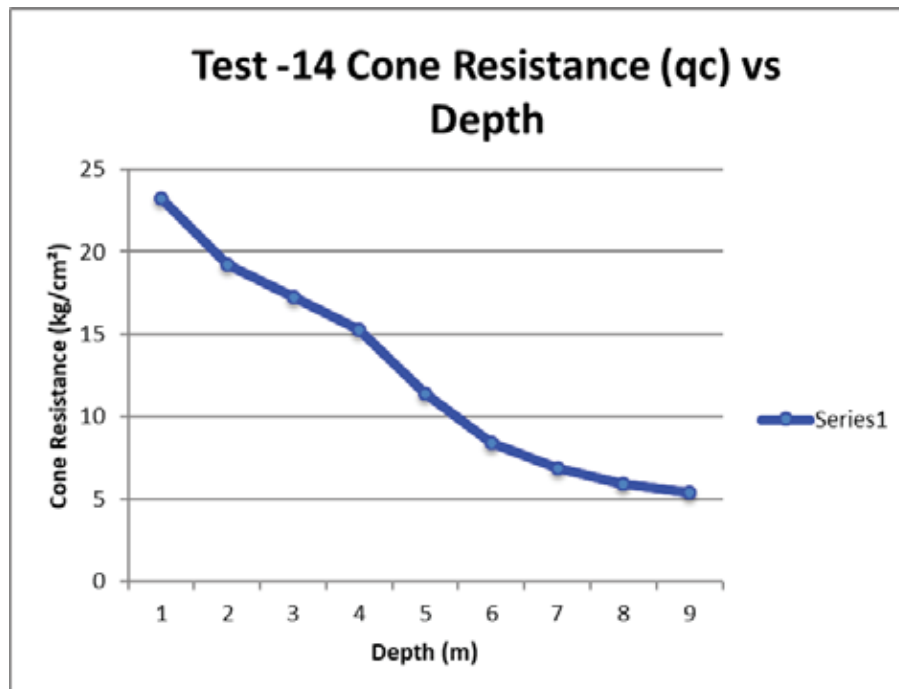
Test No.13

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	26.0	0.26	26.26
0.40	21.0	0.26	21.26
0.60	18.5	0.26	18.76
0.80	14.5	0.26	14.76
1.00	10.0	0.41	10.41
1.20	7.5	0.41	7.91
1.40	6.5	0.41	6.91



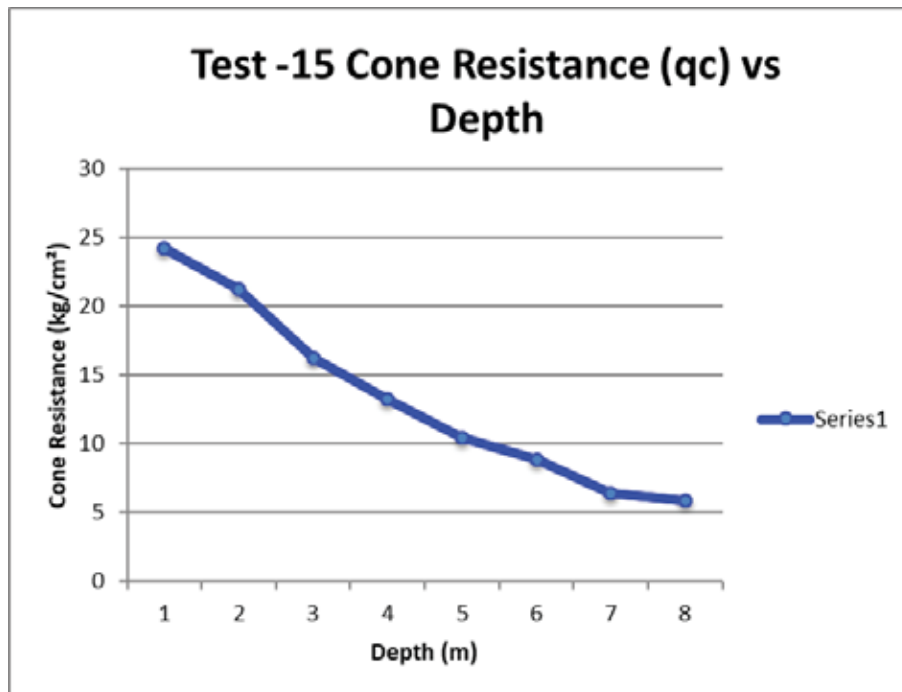
Test No.14

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (q _c) (kg/cm ²)
0.20	23.0	0.26	23.26
0.40	19.0	0.26	19.26
0.60	17.0	0.26	17.26
0.80	15.0	0.26	15.26
1.00	11.0	0.41	11.41
1.20	8.0	0.41	8.41
1.40	6.5	0.41	6.91
1.60	5.5	0.41	5.91
1.80	5.0	0.41	5.41



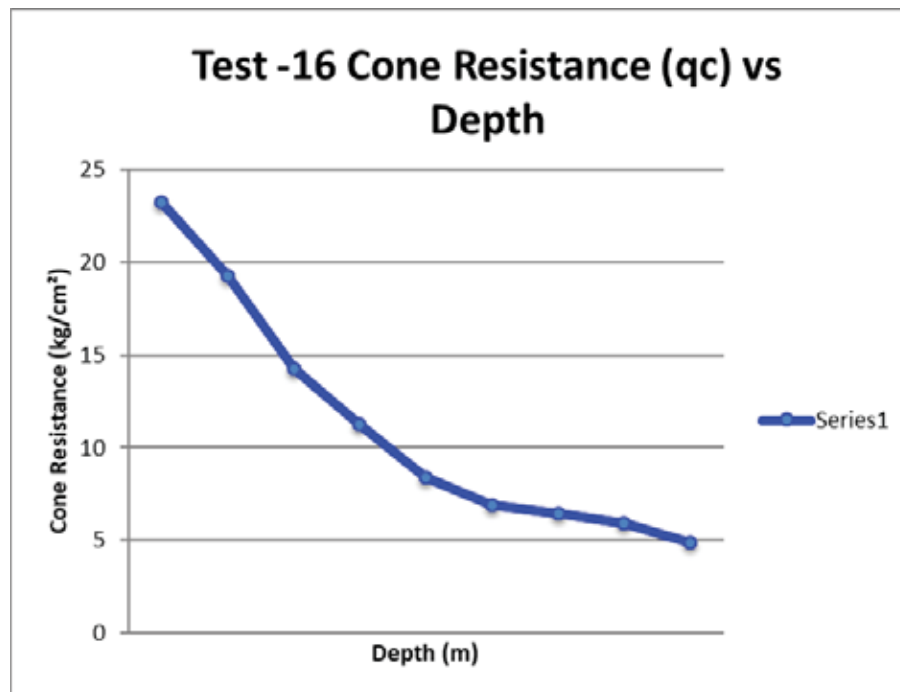
Test No.15

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (q _c) (kg/cm ²)
0.20	24.0	0.26	24.26
0.40	21.0	0.26	21.26
0.60	16.0	0.26	16.26
0.80	13.0	0.26	13.26
1.00	10.0	0.41	10.41
1.20	8.5	0.41	8.91
1.40	6.0	0.41	6.41
1.60	5.5	0.41	5.91



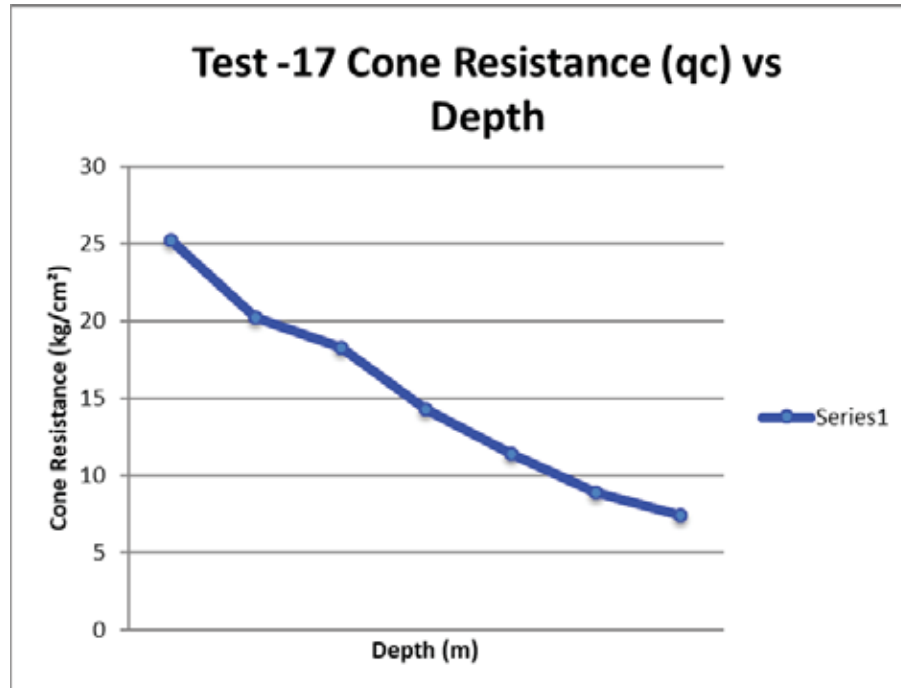
Test No.16

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (q _c) (kg/cm ²)
0.20	23.0	0.26	23.26
0.40	19.0	0.26	19.26
0.60	14.0	0.26	14.26
0.80	11.0	0.26	11.26
1.00	8.0	0.41	8.41
1.20	6.5	0.41	6.91
1.40	6.0	0.41	6.41
1.60	5.5	0.41	5.91
1.80	4.5	0.41	4.91



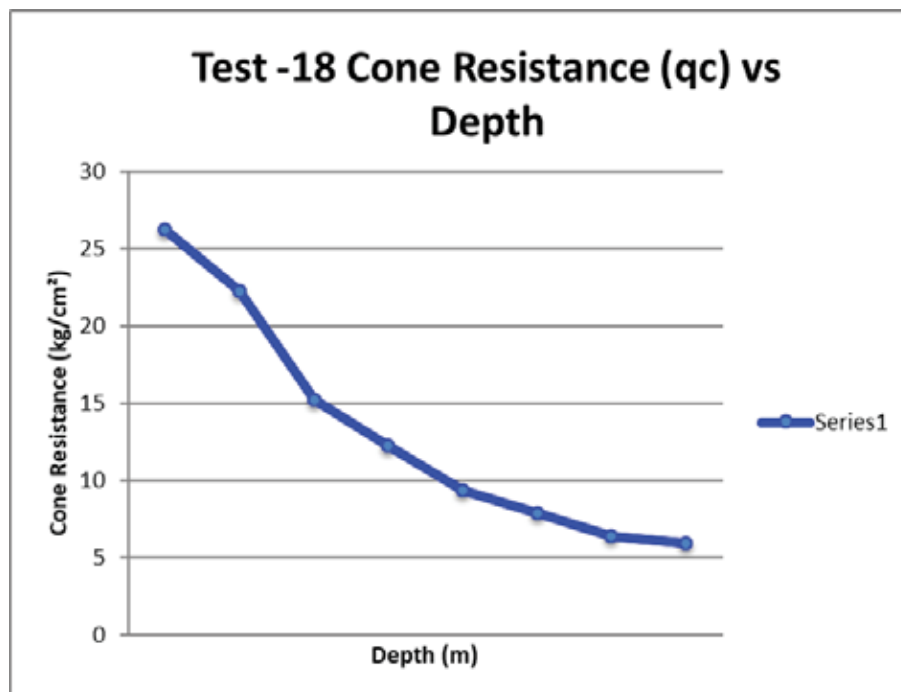
Test No.17

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (q _c) (kg/cm ²)
0.20	25.0	0.26	25.26
0.40	20.0	0.26	20.26
0.60	18.0	0.26	18.26
0.80	14.0	0.26	14.26
1.00	11.0	0.41	11.41
1.20	8.5	0.41	8.91
1.40	7.0	0.41	7.41



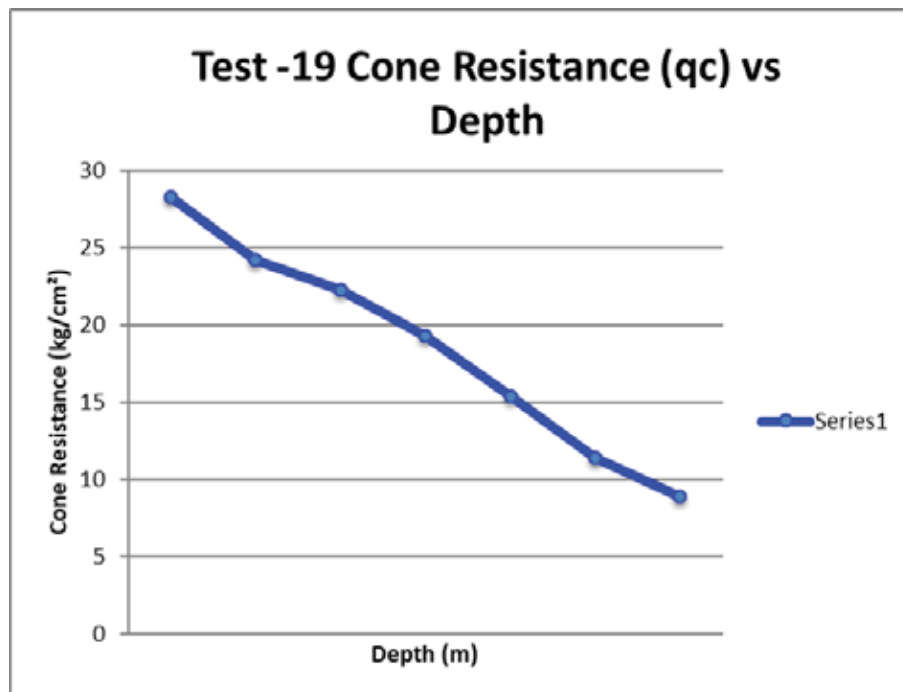
Test No.18

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	26.0	0.26	26.26
0.40	22.0	0.26	22.26
0.60	15.0	0.26	15.26
0.80	12.0	0.26	12.26
1.00	9.0	0.41	9.41
1.20	7.5	0.41	7.91
1.40	6.0	0.41	6.41
1.60	5.5	0.41	5.91



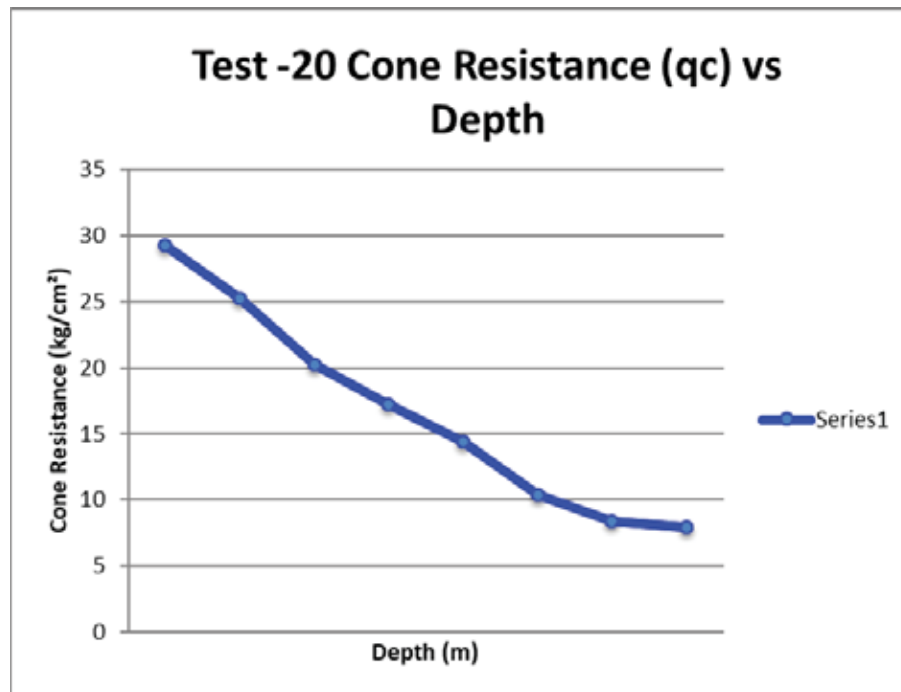
Test No.19

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (q _c) (kg/cm ²)
0.20	28.0	0.26	28.26
0.40	24.0	0.26	24.26
0.60	22.0	0.26	22.26
0.80	19.0	0.26	19.26
1.00	15.0	0.41	15.41
1.20	11.0	0.41	11.41
1.40	8.5	0.41	8.91



Test No.20

Depth (m)	Gauge Reading (kg/cm ²)	Cone Resistance (qc) (kg/cm ²)	Corrected Value Cone Penetration Resistance (qc) (kg/cm ²)
0.20	29.0	0.26	29.26
0.40	25.0	0.26	25.26
0.60	20.0	0.26	20.26
0.80	17.0	0.26	17.26
1.00	14.0	0.41	14.41
1.20	10.0	0.41	10.41
1.40	8.0	0.41	8.41
1.60	7.5	0.41	7.91



MODULUS OF SUB GRADE REACTION

BH-1

Pressure (Kg/Cm ²)	Settlement (mm)
1.10	2.270
2.20	4.660
3.30	7.105
4.40	9.875
5.50	11.350
6.60	14.320

Modulus of subgrade reaction for 30 cm dia of plate @ 3kg/cm²

$$K_{30} = \frac{\text{Pressure}}{\text{Deflection}} = \frac{3.30 \text{ kg/cm}^2}{0.71 \text{ cm}}$$

$$= 4.64 \text{ kg/cm}^3$$

As per IRC, modulus of subgrade reaction is always reports corresponding to 75 cm dia of plate

$$K \times a = \text{Constant}$$

$$K_{30} \times 4.64 = K_{75} \times 75$$

$$K_{75} = 1.85 \text{ kg/cm}^3$$

S.no	Location	K ₃₀ (Kg/cm ³) (Uncorrected)	K ₇₅ (Kg/cm ³) (Corrected)
1.	BH-1	4.64	1.85
2.	BH-2	5.04	2.01
3.	BH-3	4.61	1.84
4.	BH-4	4.92	1.96
5.	BH-5	5.60	2.24
6.	BH-6	3.84	1.54
7.	BH-7	4.80	1.92
8.	BH-8	4.42	1.77
9.	BH-9	3.99	1.59
10.	BH-10	4.31	1.72
11.	BH-11	4.45	1.78
12.	BH-12	4.00	1.60
13.	BH-13	3.42	1.37
14.	BH-14	3.90	1.56
15.	BH-15	5.30	2.12
16.	BH-16	4.42	1.77
17.	BH-17	5.04	2.01
18.	BH-18	4.78	1.91
19.	BH-19	4.48	1.79
20.	BH-20	3.97	1.58

Note: -

1. That subgrade reaction k_s of cohesionless soil increases with increasing footing size for all type of foundations.
2. Subgrade reaction k_s of cohesionless soil under rectangular plate is higher than that under square than that under circular one (at same equivalent area).

****End of Report****

S.NO.	TEST/PARAMETER	CORDINATES		DEPTH(m)
		LAT.	LONG.	
	BOREHOLES			
1	BH-1	21.725104	83.833402	30.0
2	BH-2	21.721031	83.834808	20.0
3	BH-3	21.766634	83.835488	30.0
4	BH-4	21.713973	83.834726	20.0
5	BH-5	21.712446	83.837253	30.0
6	BH-6	21.712645	83.839753	20.0
7	BH-7	21.717341	83.844997	30.0
8	BH-8	21.72123	83.846282	20.0
9	BH-9	21-721425	83.841483	30.0
10	BH-10	21.721929	83.837365	20.0
11	BH-11	21.720298	83.840088	30.0
12	BH-12	21.719279	83.843628	20.0
13	BH-13	21.720612	83.844458	30.0
14	BH-14	21.71732	83.839511	20.0
15	BH-15	21.717358	83.836308	30.0
16	BH-16	21.717343	83.84322	20.0
17	BH-17	21.714997	83.838778	30.0
18	BH-18	21.714578	83.842636	20.0
19	BH-19	21.712797	83.840401	30.0
20	BH-20	21.712947	83.83711	20.0
	ERT			
1	ERT-1	21.721889	83.837827	Ground level
2	ERT-2	21.717287	83.83939	
3	ERT-3	21.714932	83.838814	
4	ERT-4	21.715549	83.842771	
5	ERT-5	21.717402	83.843206	
	PLT			
1	PLT-1	21.722055	83.837041	2.0
2	PLT-2	21.722295	83.843338	2.0
3	PLT-3	21.714779	83.838898	2.0
4	PLT-4	21.71362	83.834586	2.0
5	PLT-5	21.713438	83.839522	2.0
6	PLT-6	21.714596	83.839959	2.0
7	PLT-7	21.714424	83.842096	2.0
8	PLT-8	21.713832	83.843505	2.0
9	PLT-9	21.715937	83.84401	2.0
10	PLT-10	21.721727	83.844731	2.0
11	PLT-11	21.72238	83.844452	2.0
12	PLT-12	21.719668	83.83452	2.0
13	PLT-13	21.720921	83.838186	2.0
14	PLT-14	21.721397	83.836382	2.0
15	PLT-15	21.719291	83.837574	2.0
16	PLT-16	21.71934	83.837527	2.0
17	PLT-17	21.716453	83.838378	2.0

18	PLT-18	21.716602	83.841682	2.0
19	PLT-19	21.71951	83.838746	2.0
20	PLT-20	21.719696	83.836613	2.0
	CPLT			
1	CPLT-1	21.721397	83.838191	2.0
2	CPLT-2	21.718286	83.843338	2.0
3	CPLT-3	21.712721	83.836816	2.0
4	CPLT-4	21.725043	83.833446	2.0
5	CPLT-5	21.713748	83.840508	2.0
6	CPLT-6	21.716692	83.838991	2.0
7	CPLT-7	21.714646	83.841536	2.0
8	CPLT-8	21.716566	83.843202	2.0
9	CPLT-9	21.717457	83.843488	2.0
10	CPLT-10	21.721557	83.846233	2.0
11	CPLT-11	21.712828	83.835582	2.0
12	CPLT-12	21.719161	83.834984	2.0
13	CPLT-13	21.722301	83.83609	2.0
14	CPLT-14	21.719827	83.838402	2.0
15	CPLT-15	21.718444	83.840274	2.0
16	CPLT-16	21.71654	83.840619	2.0
17	CPLT-17	21.715742	83.838225	2.0
18	CPLT-18	21.71883	83.839436	2.0
19	CPLT-19	21.718993	83.836958	2.0
20	CPLT-20	21.720698	83.836313	2.0
	SCPT			
1	SCPT-1	21.717406	83.843281	1.80
2	SCPT-2	21.7182	83.842672	1.80
3	SCPT-3	21.717197	83.839686	1.60
4	SCPT-4	21.720095	83.840233	1.80
5	SCPT-5	21.721368	83.837651	1.60
6	SCPT-6	21.722266	83.83601	1.80
7	SCPT-7	21.724947	83.833443	1.40
8	SCPT-8	21.720621	83.836349	1.60
9	SCPT-9	21.719576	83.836692	1.40
10	SCPT-10	21.718805	83.836972	1.80
11	SCPT-11	21.719268	83.835507	1.60
12	SCPT-12	21.717365	83.844789	1.80
13	SCPT-13	21.719487	83.843374	1.40
14	SCPT-14	21.722185	83.843137	1.80
15	SCPT-15	21.72229	83.844386	1.60
16	SCPT-16	21.721446	83.846252	1.80
17	SCPT-17	21.716246	83.843384	1.40
18	SCPT-18	21.715959	83.844099	1.60
19	SCPT-19	21.715385	83.842728	1.40
20	SCPT-20	21.714499	83.842822	1.60